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Almost three years ago the Aseptic Packaging Council, makers of the drink box, launched recycling programs for drink box containers by using the hydropulping process—which separates the paper from the plastic and foil layers. This process yields valuable, high-quality paper pulp suitable for manufacturing useful products like tissues, paper towels and writing paper.

To date, drink box recycling programs have grown to include over 1600 schools in 17 states and curbside pick-up at 1.6 million homes. What's more, other polycoated paperboard products can take advantage of these efforts—milk

cartons are already being recycled with drink boxes in most programs.

A number of haulers, processors and hydropulpers currently participate in drink box recycling programs. For information on how you can work with the Aseptic Packaging Council to recycle more polycoated paperboard materials, visit Booth 620 at the National Recycling Congress or write: APC, 1000 Potomac Street N.W., Suite 401, Washington, D.C. 20007.

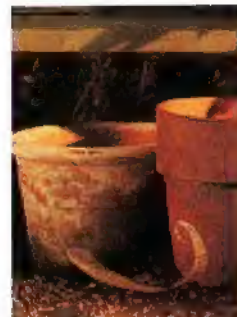


 Tetra Pak  THE MAKERS OF THE DRINK BOX

ASEPTIC PACKAGING COUNCIL



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GARBAGE The Practical Journal for the Environment ISSN 1044-3061 is published bi-monthly for \$21 per year by Dovecot Publishers, The Blackburn Tavern, 2 Main St., Gloucester, MA 01930. Telephone (508) 283-3200. Subscriptions in Canada are \$29 per year, payable in U.S. funds.

Second-class postage paid at Gloucester, MA and at additional entries. POSTMASTER: Send address changes to GARBAGE, PO Box 50519, Boulder, CO 80322.

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IN THE DUMPSTER

Compost happens all on its own, so why do we need those compost jumpstarters? Two words: We don't.

Cover photograph by
Brian Smale

styling by Karen Vaughan;
hair & makeup by Audrey Berman

Back cover illustration
by Steven Pietzsch



An Activist's Mettle

“YES, I THINK YOU ARE OFF ON A NEW TACK; AND I THINK it is time, for the winds have shifted, and those who failed to notice will go on setting a course that drifts further from real environmental goals. ¶ “Something changed in environmentalism since its early days. It is now a passion of negativity. The positive buckle-down-and-clean-it-up aspect

has been replaced by galloping paranoia: We hear screams of fear and fury but very little of the murmur of argument and debate. You are probably doomed to failure in your effort to introduce evidence-based argument and reasoned debate of differing analyses. Few people want to hear you. What they want to hear is blaming: **THEY** are doing these awful things to **US** and **WE** can't stop **THEM**.

“I would not like to do activism an injustice, but apart from its usefulness in identifying particular culprits (when there happen to be some), I have myself found it mostly an enhancer of conflict, a glorifier of emotionalism, a stubborn rejector of any evidence which does not support a foregone conclusion and, in the end, a lover of defeat.

“Negativity has become characteristic of the American response to many social and political ideas. Very few people voted for Clinton, they voted *against* Bush. They have voted against ‘big government,’ but not for small enterprise. They want cheaper and better medical care but no taxation to pay for it. They are against welfare, but they are also against spending the money and time and effort required to mandate the education that makes people employable.

“I am old; I remember a different social atmosphere, a time when activism meant *beginning* as a critic, and going on from there to be a reformer, rebuild, rebel if necessary — and always responsible.

This social conviction (indeed, a social contract) has vanished. Party-line, but in effect really rather passive, activism in all areas is the way of today's United States. I admire your valor in bucking it....

“Experience informs what I write. I have been struggling with environmental matters for 50 years, from a time when very few people were concerned. About ten years ago the small incorporated village in which I live began putting together a long-term coastal management program. The program is now adopted, approved by the state, and in action. The administering commission, unpaid, has put together a quantity of objective evidence concerning the harbor (including hydrological computer modeling, intensive testing for pollutants, close analysis of existing problems by the institute of marine sciences at a nearby university), out of all of which a proposal for remediation is emerging. *In none of this has any activist environmental group taken any part.*

“As far as I can learn, their suspicions are aroused because (1) no culprit has been fingered; (2) the activist conclusion — that pollution was traceable to septic-tank seepage — has been contraindicated by the evidence; (3) the proposed remedies will be fairly costly, and will require at least a decade before their effectiveness is felt. The activists don't object to spending the money; they fix upon the slowness of the turnaround, which indeed will have no

drama about it. My own suspicion (suspiciousness is contagious) is that the uncontroversial, non-confrontational, basically apolitical nature of the proposed remediation suggests to them that coastal management is, as one of them said, ‘a nothing.’

“Global warming is an object of delight to those who are busily criticizing you because it is *hugely* publicizable, terrifying, and hard to assess objectively; it is a great supplier of *frissons*, and there are plenty of targets for pointing fingers. One cannot argue with millennarians who believe with all their hearts that the world will end tomorrow; to try is to be labeled a heretic. One can't argue with hot environmentalists either; to try is to demonstrate oneself as corrupted, traitorous, an enemy.

“I wish that environmentalism didn't attract so many people who have difficulty accepting that to diagnose evils and denounce them carries the responsibility of proposing ways to remedy the situation. I wish it weren't cursed with righteousness, like the Salem witch-hunters. I wish we might work together. Indeed I wish you well.”

ANNE SAYRE

The Shore House, St. James, New York

Your actions speak louder than your words, Anne, both in what you've done at home and in taking the time, fatigued or not, to write to me. Until I started *GARBAGE*, I had always thought of environmentalism as a loving, progressive, positive result of American social evolution. It should be. Now, in the thick of it, I also see what you see. I agree that the wind is shifting and I intend to keep sailing.

Thank you. It is good to know that one with your perspective would give me the benefit of the doubt, and not assume that this little magazine is the result of an industrial conspiracy.

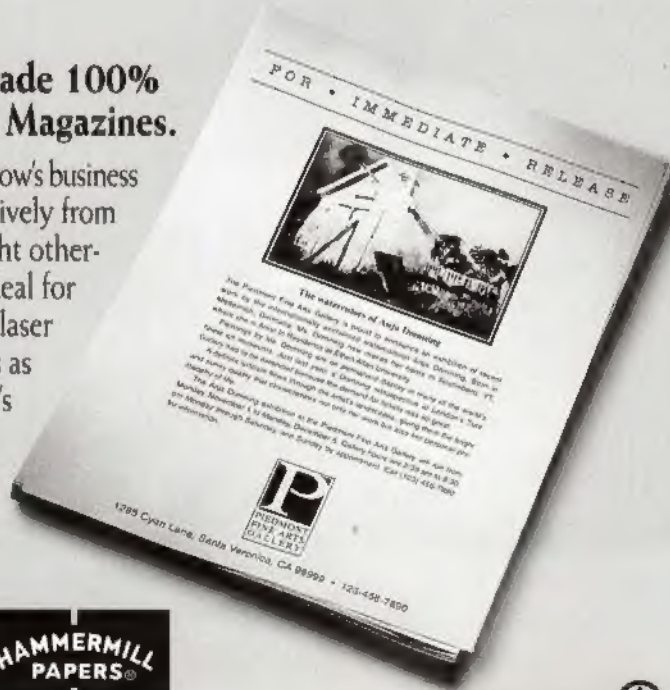
— Patricia



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GARBAGE THE PRACTICAL JOURNAL FOR THE ENVIRONMENT is published by Dovetail Publishers, The Blackburn Tavern, 2 Main St., Gloucester, MA 01930. Telephone (508) 283-3200. Advertising: (508) 283-4721. Newsstand sales: (508) 283-3200. Letters to the editor and author's story queries should be sent to editorial offices, noted above. Publisher disclaims all responsibility to return unsolicited editorial and graphic matter. Letters to GARBAGE magazine and its editors become the property of GARBAGE. Articles appearing in GARBAGE are indexed in Environmental Periodicals Bibliography, Environmental Studies Institute, 800 Garden St., Ste D, Santa Barbara, CA 93101; (805) 965-5010.

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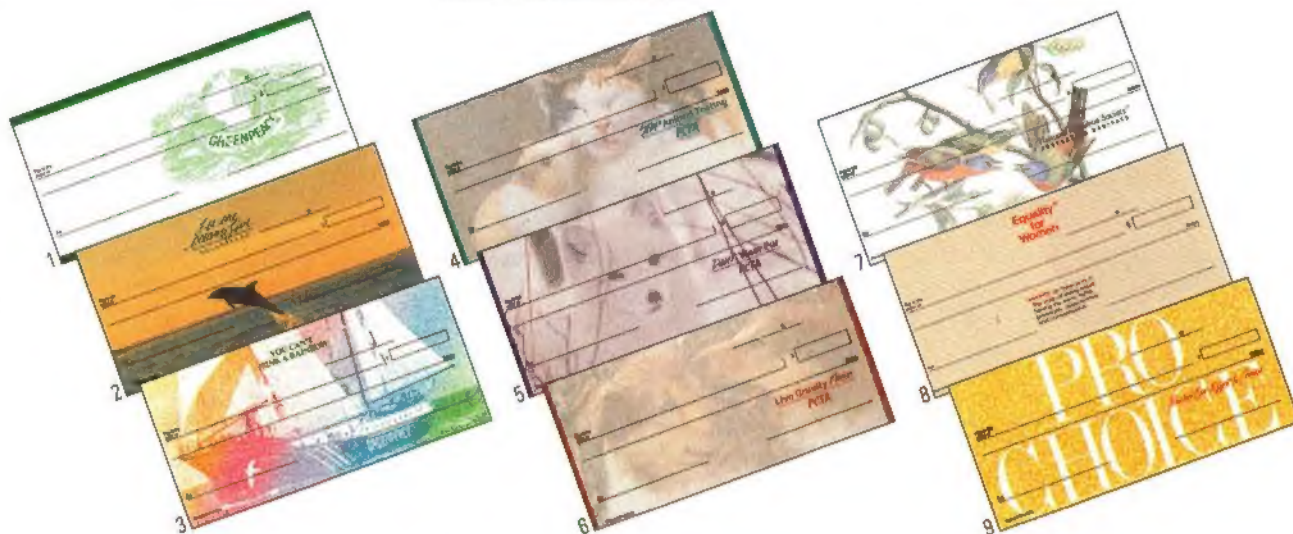
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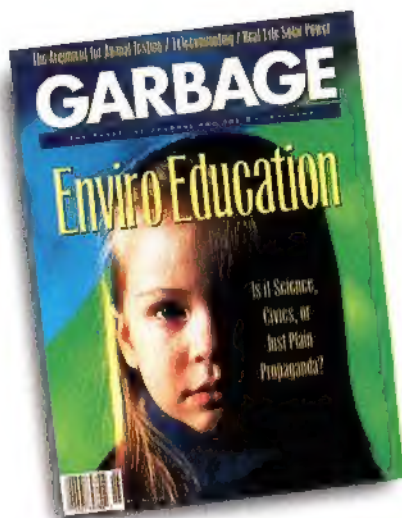
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LETTERS

Educated Response

WE RECEIVE A HUNDRED PERIODICALS, MOSTLY in the (frankly dreary) trade-journal category. When I came across GARBAGE, I had to take it home, share it with my wife, and read it cover to cover. This is one of the most interesting, readable, well balanced, and graphically pizzazzy magazines out there.

I especially enjoyed the cover story on environmental education. This is a "science? social studies?" area about which I and others have felt uneasy without knowing exactly why — until your piece articulated it.

STEVEN GERBER
Amsoil Inc.
Superior, Wisc.

WE DISAGREE WITH MS. POORE'S OPINION. THE National Audubon Society has been a leader in environmental education for more

than 50 years. Yes, in recent years recycling has been a topic of discussion in the National Audubon Society's education material, along with wetlands, rainforests, spiders, migratory birds, and mammals. Through ecology camps and workshops, teacher training, nature centers, and environmental curricula, Audubon [has] introduced science lessons in ecology, ornithology, biology and more to millions of children and adults.

True, teachers are innovators who have incorporated environmental lessons into their classrooms with whatever materials they have been able to get their hands on. But unlike GARBAGE's perception of environmental education as a tool to turn children into activists, it is National Audubon's experience that children have an inherent do-good streak which teachers are struggling to channel into responsible actions.

PHILIP SCHAEFFER
Vice Pres., National Audubon Society
Washington, D.C.

With its emphasis on natural science, Audubon's educational efforts are, in my opinion, excellent. I would think that the more recent spate of simplistic, garbage- and activist-oriented material would offend you as much as it does me!

— P. Poore

"ENVIRO EDUCATION" WAS RIGHT ON TARGET. May I add a modest suggestion to your theme of fairness?

I believe we should delay environmental education until the middle-school years. Most environmental issues require relatively complex thinking and some appreciation of economics. We don't ask grade-school children to study physics and calculus, so why do we insist that they study environmental problems in a fashion so simplified that the issues lose all resemblance to reality? Brainwashing children for a "worthy" cause is reprehensible; the ends do not justify the means.

KENNETH W. CHILTON
Center for the Study of American Business
St. Louis, Missouri

AFTER I READ YOUR COVER STORY, I COULDN'T help but think about the newspaper recently put out by our local grade school.

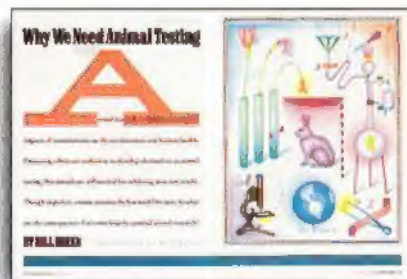
The editorial cartoon by a fourth grader showing birds and flowers wearing gas masks was the first thing that came to my mind. (For a while a waste-to-energy incinerator, RDF-type, was being considered for our community.) There was also a letter to the editor that noted: "Some people say it is going to provide needed jobs and a way to get rid of garbage. But other people know better. The incinerator will most definite-

Animal Outrage

BILL BREEN'S ARTICLE "WHY WE NEED Animal Testing" (April/May '93) completely misses the point: Animal tests do not keep toxins out of the environment. More often than not, animal testing keeps unsafe and unsound products on the market.

It would take over a millennium to assess those chemicals already in use. If the standard tests provide "inconclusive" results, another decade is lost while the chemical remains on the market.

Clearly, expensive, inaccurate, and tediously slow animal tests must be replaced. Cell culture tests can accurately predict which chemicals are likely to damage DNA, a step thought to precede cancer development. Other tests can detect early DNA damage in humans and thus screen for already exposed populations. These tests are faster, less expensive, and more



accurate than animal tests.

Protecting people from carcinogens will require building better tests. And better tests means those that examine cells, not rats.

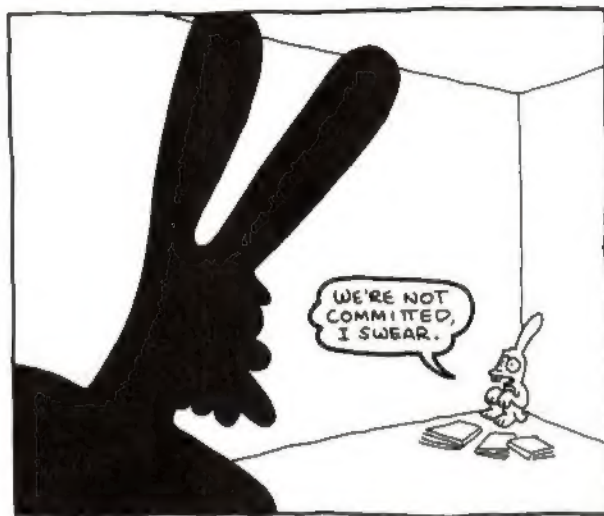
NEAL D. BARNARD, M.D.
President, Physicians Committee for
Responsible Medicine
Washington, D.C.

Dr. Barnard, fully one-third of the article covered *in vitro* testing, including a chart delineating alternative testing methodologies. All of the toxicologists I interviewed support *in vitro* — and all agree it cannot completely replace whole-animal testing.

— B. Breen

ALTHOUGH I APPRECIATE BEING CALLED A "THOUGHTFUL ACTIVIST," I take issue with your characterization of me as someone who "acknowledges the need for some types of animal testing." What I acknowledge is that alternatives to [continued on p. 13]

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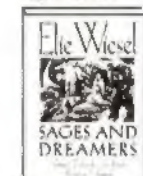
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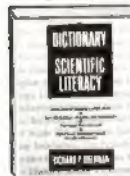
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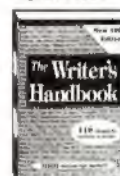
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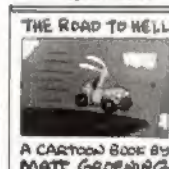
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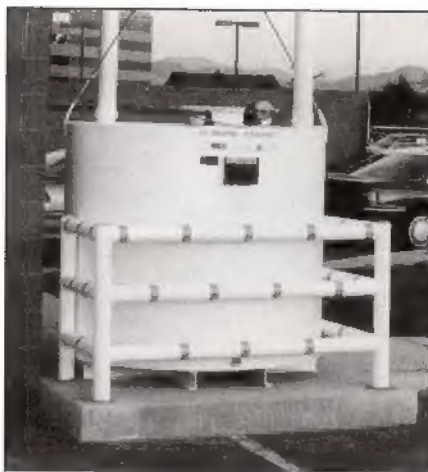
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
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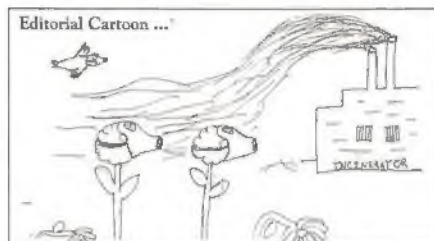
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ly pollute our air and our ground, making it almost impossible to grow crops on. It may also pollute our already dirty Illinois River."

He is only echoing the comments of



adults. As far as the river is concerned, no one talks about the greatest danger to the river — area farming practices that ignore conservation techniques.

WENDY MARTIN
Havana, Ill.

NOTHING IS PURE SCIENCE, CIVICS, OR PROPAGANDA. Everything contains some of each. You state that the curriculum is politically oriented. All curricula are politically oriented, either towards the status quo, or towards change.

RICHARD FOY
Redondo Beach, Calif.

I, TOO, SHARE YOUR CONCERN THAT CHILDREN are being taught to be fanatical. We're still in the toddler stage in environmental education. We [educators] have definitely been overshadowed by the commercial press and their use of glitz, because frankly we are working on shoestring budgets with volunteer time, and praying for grants to pay the printing bills. But we are out there in the classrooms, opening up new doors for your children.

PAULA L. PORTER
Director of Publications
Soil and Water Conservation Society
Ankeny, Iowa

Nuclear Dumpster

I'M STUNNED BY THE GLIB VOICE FROM "IN the Dumpster" (April/May). Bill Breen is dancing with the elephant when he states: "There has never been an accident at a U.S. nuclear reactor which has blighted the landscape." It must take some fancy steps to keep his attention on the media event that was Three Mile Island while trying to avoid having his lower extremities mashed by decades of "loose radiation" events at places like Han-

ford, Rocky Flats, INEL, Savannah River, etc.

If Breen must dance the dumpster dive, it would be nice to see some "still useful" information pulled out of the nuclear debate refuse pile. A cradle-to-grave look at the nuclear industry ("private" and public) will reveal soaring cancer rates and blighted landscapes. Three Mile Island may be the most visible U.S. nuclear accident, but it's certainly not the "nation's worst (nuclear) accident."

FORREST HESSELBARTH
Grangeville, Idaho

PLEASE DON'T SOFT-PEDAL THE DANGERS OF nuclear power. What about the increased cancer rates at the Pilgrim plant in Massachusetts? What about the three-foot-tall dandelions near Three Mile Island? And the [financial] settlements prohibiting those who suffered from talking about what happened?

PETER SAKURA
Somerville, Mass.

I expressed my opinion, so labelled, on the tactics used by some anti-nuke commentators, not my opinion on the industry. Also, my references were to commercial power plants—not weapons-production plants and waste-storage facilities, which are a different story.

—Bill Breen

Penalizing Plastics

YOUR OBVIOUS DEDICATION TO ACKNOWLEDGING the two sides to every story provides wholesome food for thought.

The Packaging issue [Dec./Jan '93] did an excellent job of pointing out that packages do have "life before death"; i.e., a package serves many purposes in product delivery, protection, etc., and its economic and environmental impact cannot be judged merely on its recyclability. Moreover, measuring recycling performance on a cost-per-ton basis adds insult to injury because source reduction, acknowledged as the most effective resource conservation tool, is penalized. Adherence to "design for reduction" has resulted in plastic packaging delivering 50 percent of the goods to the home while contributing less than 10 percent of the packaging. Thus there is no way that plastics can win the "cost-per-ton game," a conventionally accepted performance measure. Until source reduction is placed back within resource management options, society and its resources will [continued on p. 13]

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RONALD A. PERKINS
Director, Recycling Operations
American Plastics Council
Washington, D.C.

On Garbage

THE SCREAMS OF ANGUISH AND RAGE IN THE JULY letters column convinced me that GARBAGE must be saying something relevant and realistic. Enclosed is my check for a subscription.

Environmentalism is part science and part religion. In case of a tie, religion wins. But it is crucially important that all of us retain our scientific integrity and skepticism. Hang in there!

GLENN SWOGGER JR., M.D.
Topeka, Kansas

I'D LIKE TO WEIGH IN ON YOUR DEBATE WITH readers regarding political correctness. Before government service I held a number of active positions with national, regional, and local environmental groups. I believe very much in afflicting the comfortable and certainly that government does not move unless you kick it regularly.

Now, while I don't agree with everything GARBAGE [says], some of the magazine's readers appear to have forgotten that heresy is a virtue, conformity a bore, and unquestioning acceptance of a particular environmental dogma a sign of brain death.

WARREN C. LIEBOLD
Director of Conservation
NYC Dept. of Environmental Protection
New York, N.Y.

WHAT A GREAT IDEA! AN IMITATION ENVIRONMENTAL journal financed by industry to sucker each subscribing environmentalist out of \$21 per year. Great sense of humor, folks! Garbage, get it?

Please cancel our subscription, pronto. (And, oh, have a nice day.)

PHIL & NANCY ENGLE
Latrobe, Penn.

THE EXTREMISTS WHO ARE RUSHING TO CANCEL their subscriptions are missing an important point. They seem to want GARBAGE to be read only by those who already share their views, to be some sort of cheerleader on the environmental sidelines. But what good does that do?

Industry is reading the magazine [and] interacting with the environmental community. You don't learn anything from irrational dogma, and few people would waste their time reading such drivel anyway. Thoughtful, fair reporting, on the other hand, attracts anyone who is serious about learning. Isn't this what environmentalists want?

You needn't fear that the big bad polluters are turning GARBAGE into a propaganda rag; they already have plenty of those, as do the environmental extremists. What GARBAGE is turning into is a much needed platform for honest, rational debate. Is that so frightening?

PAUL ERIC YOUNG
St. Louis, Missouri

Animal Outrage [Cont. from p. 8]

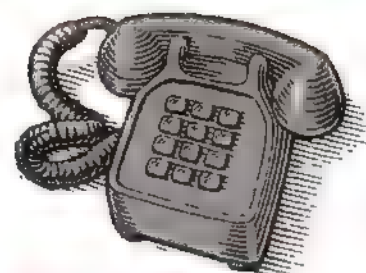
some animal tests are not yet available. As a representative of an animal protection organization, I use this assessment of the status quo to argue for greater commitments to the development of alternative methods, not to argue that some animal tests are still needed.

MARTIN L. STEPHENS, PH.D.
Vice Pres., Laboratory Animals Program
The Humane Society of the U.S.
Washington, D.C.

WHO ARE YOU PIMPING FOR? THE ANIMAL testing piece is so ignorant and dangerous I can't even respond. Haven't you all heard of context and balance? Stop being whores for corporate millions — including vivisectioning researcher thugs!

JANET BROWN
Granada Hills, Calif.

THERE IS MORE TO A PHILOSOPHY THAN fits on a bumper sticker. Animal-rights activists are engaged in a political dispute which forces them to truncate and radicalize their positions. Scientists and reporters who really want to understand the reasoning behind animal-rights views should consult the growing body of serious philosophical work on it. Serious students of the controversy should begin with Peter Singer's *Practical Ethics* [continued on p. 61]



HELLO, HILLARY?

RECENTLY, thousands of our customers called Hillary Rodham Clinton to express their views on health care—and didn't pay a dime.

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It's a fact: American homes contain dozens of household waste products. A lot of that seemingly harmless stuff we've got lying around the garage, basement and under the kitchen counter is dangerous hazardous waste. It is estimated that the average household contains ten to fifteen gallons of waste materials.

Many concerned community groups and city leaders are actively seeking ways to organize collection programs to prevent household hazardous wastes from finding their way into local sanitary landfills and water resources. That's why more and more communities are calling Laidlaw.

Laidlaw Environmental Services is one of the nation's largest organizations committed to the effective management, transportation and disposal of household hazardous waste. Across the nation,

we've helped create responsible community partnerships to educate people about the dangers of household hazardous waste. We've also organized and participated in hundreds of waste collection programs.

So, if your community is thinking about organizing a household hazardous waste collection program, or if you'd like to know more about how Laidlaw Environmental Services can help, call 1-800-356-8570. Our Manager of Household Hazardous Waste is available to answer all your questions about conducting a waste collection program in your community.

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Lifting the Lid

IN THE GARDEN

A Reel Man

Botanist Preaches Push Mowers

BILL NIERING LOVES LAWN MOWERS. Not just any lawn mowers — in fact, it could be said he detests power mowers. But send him out to the Saturday yard sales, and it's a fair bet he'll come home with a rusty, creaking reel mower. He will tinker it up, run a file over the blades, and add it to his inventory. Recently, he had eight of the old machines — by-gone brands like Pennsylvania Quality, Scotts, and Sears — but then managed to unload three of them on colleagues at Connecticut College in New London, where he teaches botany. (The other five are awaiting good homes.)

Given the trend toward reel mowers, his colleagues would be well advised to adopt one. The American/Great States lawn mower company, which claims 95 percent of the domestic reel-mower market, has seen phenomenal growth in recent years: from 84,000 in 1985

to 200,000 in 1992. Gardening magazines have added reel mowers to their offerings, chatting up the new, light-weight models that make the old ones look like Studebakers. A new sharpening kit means you can keep your American/Great



States snipping nicely without a visit to the shop. But all this newness has a price: The cheapest new reel mower is about \$50, but with options like chromed hubcaps, smooth-rolling reels, and seven cutting blades, they can fetch \$130.

There's no shortage of reasons for the run on reel mowers. A grow-

ing awareness of air and noise pollution has sent the power mower trundling into the dog house. Last fall the federal Environmental Protection Agency gave the gas hogs a severe scolding, announcing that a power mower running for one hour emitted as much voc pollution (volatile organic compounds) as a car driving 50 miles. A study by the environmental consulting firm Mills McCarthy Associates found that over a seven-year lifetime, gas-powered mowers spew 28

lbs. of hydrocarbons and nitric oxides (contributors to smog), 300 lbs. of carbon monoxide, and 1,400 pounds of carbon dioxide.

Unlike cars, these small engines have largely escaped regulation on both the air and noise pollution they generate. California, in particular, is cracking down on

lawn, garden, and utility engines, and has mandated a 45 percent reduction in their emissions by 1994; 55 percent by 1999. It comes as no surprise that Southern Californians buy 30 percent of American/Great State's mowers.

But even if power mowers were clean, they'd still be relatively expensive. Their [Continued on p.17]

A GARBAGE PROBLEM

Enviros Fight Recycling Plan

FILE THIS UNDER "MAN BITES DOG": In West Sacramento, environmental activists are battling a plan to construct a state-of-the-art recycled newsprint mill which would greatly bolster California's paper recycling capacity.

MacMillan Bloedel, a Canadian forest products company, in a joint venture with the Hatndl Papier Corporation (Germany's largest maker of recycled newsprint), hopes to build a \$1 billion plant which would take in a whopping 568,000 tons a year of old newspapers, magazines, and office paper to make paper with 100 percent post-consumer recycled content.

But not if the Sacramento Valley Toxics Campaign gets its way. The local group believes the area cannot handle the air emissions from the plant, nor the 3 million gallons a day of secondarily treated wastewater the plant would discharge into the Sacramento River. In October '92, the group filed a lawsuit against the City of West Sacramento and MacMillan Bloedel in Yolo County Superior Court, seeking a court order overturning the city's certification of the project's environmental impact statement. At press time, the two sides were attempting to negotiate a settlement.

"We simply don't know what's in their wastewater," says Alison Anderson, the environmental group's president. "Just because it's recycling doesn't mean it shouldn't be held to the same standards as any other heavy industry."

"Other environmental groups completely caved in and sucked up to the state and MacMillan Bloedel so they

could point to a recycling victory," adds Michael Picker, chief of staff to Sacramento's mayor.

Statewide environmental groups say that Bloedel bears some responsibility for the ill will because it neglected to consult with local folks early on. But they reject local enviros' environmental objections.



"Environmentalists can no longer afford to be anti-industry," sighs Sandra Jerabek, executive director of the statewide Californians Against Waste. "Yes, a plan for dealing with water emissions needs to be hammered out with the company. [But] this mill is absolutely vital for California recycling."

Newspaper recycling in California should work like a charm. Californians collect roughly 900,000 tons of old newspapers a year, according to the California Integrated Waste Management Board. And the Golden State's

newspaper publishers use 40 percent post-consumer fiber in at least one-fourth of their newsprint.

But over 60 percent of the old newspapers (ONP) collected in California each year are either exported to markets in Asia, or trucked to paper recycling mills (deinking plants) in Canada and the Pacific Northwest, only to be trucked back to California buyers as recycled paper. The circuitous journey is bad news for recycling because it increases processing costs and reduces the price recyclers can get for ONP. Worse, it costs the environment. Trucking thousands of tons of yesterday's news across hundreds of miles consumes fuel and adds to air pollution.

Bloedel's proposed mill could detour much of the ONP that's currently bound for northern climes. But for now, the company says it won't give a green light to the project — even if all environmental objections are met. The reason is straight dollars and cents: Executives cite low demand for newsprint (recycled and virgin) in California due to the recession.

"Based on today's market for newsprint, which I would character-

ize as abysmal, moving forward would be a questionable economic decision," says Bloedel spokesman Alan Stubbs.

MacMillan Bloedel's dilemma is a telling example of how difficult it can be to site an industrial project, even when executives can rightly claim that it benefits the environment. National recycling organizations are monitoring the outcome because of the deep impact it could have on West Coast recycling. "I've [never] seen this amount of controversy over siting a recycling mill," marvels Kathleen Meade, spokeswoman for the National Recycling Coalition.

Until the paper mill is built or some other alternative found, much of California's old news will continue to take its long, strange trip up and down the West Coast.

— Paul Hood and Ethan Seidman

EDITOR'S NOTE: As this issue was being prepared, freelancer Paul Hood died in a climbing accident in Washington's Olympic Mountains. We extend our sincerest condolences to Paul's family.

For the Record

"We're the conservative party. We care about conserving."

— Former EPA administrator William K. Reilly announcing the formation of a group aimed at promoting environmentalism among Republicans.

"Let's call it a pale greening of the conservatives."

— California Democratic State Senator Tom Hayden
(L.A. Times, June 16, 93)

[Continued from p.15] purchase price runs double that of reel mowers, and they require regular sharpening, tune-ups, and gasoline. Add that reel mowers are much less inclined to sling rocks and other ammunition at your ankles, and they start to look pretty fabulous.

If only it didn't need to be pushed. Anyone who grew up with a reel mower probably has a rite-of-passage memory associated with getting the thing to move. But as Jim Hewitt of American/Great States points out, the reel mower's strict diet of aluminum and plastic has helped it shed 20-plus sluggish, cast-iron pounds. Though to the eye it appears closely related to the mower of yesteryear, from the pushing point of view this nimble new generation is barely recognizable. Besides, pushing is good for you — it burns about 400 calories an hour.

But if Dr. Niering triumphs, you won't be pushing for an hour. This 69-year-old co-founder of the Nature Conservancy uses reel mowers as a medium. His actual message is roughly, 'If you have more lawn than you'd want to mow with a push mower, you have too much lawn.' In a pamphlet he co-edited in 1977, the lawn is vilified as a luxurious "man-made mini-monoculture," and a "botanical absurdity." Instead, the authors promote something called "naturalistic landscaping": the restoration of low-maintenance, native shrubs, trees, and ground-covering plants. (Dr. Niering speaks glowingly of the "moss lawn," which is soft, drought hardy, and nearly maintenance free.) His own backyard is an acre of wild grasses and shrubs, ringed with evergreens to spare his suburban neighbors the riotous view.

If you're ready to mothball the motor mower, new reel mowers are now in every hardware store worthy of the name. Old mowers go for \$5 or so at

For the Record

"Deinking sludge is catching on as perfume among the environmentally aware, liberal crowd."

— The number 3 reason to recycle paper, according to Alan Rooks, editor in chief of PIMA, the magazine of the Paper Industry Management Association (January 1992)

yard sales. Dr. Niering uses a fine rat-tail file to sharpen them, being careful to follow the curve of the blade. This isn't easy; the mechanically disinclined will probably save much aggravation by going to a professional.

In a related department, if you (or your neighbor) is in possession of an atrociously loud leaf blower, run it through the chipper and check out the outdoor equivalent of the old carpet sweeper. A leaf blower's roar measures about 90 to 100 decibels — equivalent to a .22 rifle shot, obviously prolonged. (It's the duration of the noise that's so noisome.) The human-powered leaf sweeper gives your ears a rest. Roughly the dimensions of a reel mower, it sweeps leaves into a heavy-duty collection bag.

— Hannah Holmes

FOR MORE INFORMATION

AMERICAN/GREAT STATES (REEL MOWERS),
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One Very Conscientious Objector

NAVY SAILOR AARON AHEARN is facing court-martial after going AWOL from his ship for 10 weeks. Ahearn claimed he could no longer bring himself to throw 200 bags of trash overboard daily as ordered.



Ahearn also claimed he saw other sailors toss fur-

niture, solvents, paint, and even computers; and that the ship released raw sewage while near port.

Jettisoning trash while at sea violates Navy policy, but not the law. Until Jan. 1, 1994, the Navy is not bound by the MARPOL treaty banning sea dumping.

The Ban That Time Forgot

MAINE LAWMAKERS THIS past June reaffirmed the state's 1989 ban on the plastic yokes that hold beverage six-packs together. The Legislature also postponed the ban's start-up date for nearly a year — as it has

done each year since the ban was enacted.

Why? Each time the effective date approached, industry has convinced lawmakers that a new kind of wildlife-safe yoke would be available by year's end....

Porkbellies and PET

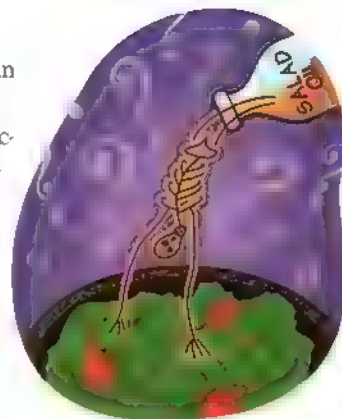
RECYCLERS HAVE LONG STRUGGLED to get people to think of recyclables as valuable commodities, rather than fancy garbage. That effort got a boost when the Chicago Board of Trade announced it would work with the Recycling Advisory Council (RAC) to establish the country's first recyclables cash exchange market.

The exchange will provide an electronic forum for buyers and sellers of recyclables. The RAC hopes the on-screen trading will grease the wheels of recycling by providing potential buyers with accurate pricing information, and by standardizing quality specifications.

What? Common Sense?

NOTING THAT A TRUCKLOAD of salad oil spilled on the highway could cause environmental damage, U.S. Secretary of Transportation Federico Peña nevertheless announced this past June that salad oil would not be classified as a hazardous material.

After hearing public comment on the



subject, the Transportation Secretary employed an unusual regulatory logic to arrive at his decision: common sense.

"To many Americans, the federal regulatory process is the perfect example of what's wrong with government," reads a statement issued by Sec. Peña. "It's time to start making sure federal regulations make sense in the real world."

Wind and Oil: Kissing Cousins

IN A RARE EXAMPLE OF COOPERATION between a fossil fuel and an alternative energy source, windmills are powering four oil wells in Oklahoma.

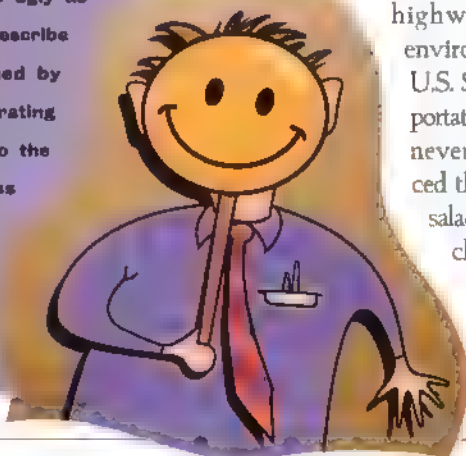
The local electric utility was charging the Magic Circle Energy (oil) company a steep 16¢ to 19¢ per kilowatt hour to juice its pumps. The small, 10-kilowatt windmills manufactured by Bergey Windpower in Oklahoma City offered a better deal: a one-time only capital investment for purchasing the windmills, which worked out to about 10¢ per KWh over 10 years.

— Ethan Seidman

This Just In...

Oh My God! It's a LEPER!

For the acronym file, under "L": What do NIMBYs fear most? LEPERS — Local Environmental Projects Everyone Resists. • New Haven attorney Gregory J. Pepe coined the term in the February issue of *Waste Dynamics of the Northeast*. He describes the familiar scenario: The community gathers to consider a proposed landfill, or perhaps a composting plant, with various experts and regulators on hand. Things start out civil enough, but "at some point the meeting will become ugly as community organizers describe the latent dangers posed by the LEPER." • Incorporating community concerns into the decision-making process can help prevent a project from mutating into a LEPER, says Mr. Pepe.



The Garbage Index



Poll Watch

Teenagers who say young people can make "a lot of difference to the environment" by recycling: **74 percent**

Teenagers who say young people can make "a lot of difference" by reducing waste: **54 percent**

People over 50 who answered "no" to the question, "Do you intend to get a tan this summer?": **70 percent**

People 18-34 who answered "no" to the same question: **39 percent**

People in 1988 who thought the U.S. government should be doing more to protect the environment: **87 percent**

People in 1993 who say the government should be doing more: **82 percent**

People in 1988 who said they would pay higher taxes to protect the environment: **32 percent**

People in 1993 who say they would pay more: **28 percent**

People "very interested" in news on waste issues: **52 percent**

Men "very interested" in news on alternative energy sources: **59 percent**

Women "very interested" in news on alternative energy sources: **33 percent**

Men "very interested" in space-exploration news: **41 percent**

Women "very interested" in space-exploration news: **19 percent**

Men "very interested" in news on agricultural biotechnology: **38 percent**

Women "very interested" in agricultural biotechnology: **50 percent**

Number of newspapers with science sections, 1990: **96**

Number of newspapers with science sections, 1992: **47**

Sources: Camp Fire Inc. Time Greenwire Science

"Doing Their Low-Level Best" (Dec/Jan '93)



At the stroke of midnight on Dec. 31st, '92, the federal law governing low-level radioactive waste (LLW) made each state responsible for disposing of its own radwaste. Nine months later, few states have made any headway towards siting a disposal facility. In North Carolina, foes of a planned LLW disposal site countered with their own proposal: store the waste at commercial nuclear power plants. Legislators scoffed. In Texas, *Greenwire* reports that a group called Alert Citizens for Environmental Safety filed a lawsuit in federal court seeking to block the state's plans to build a LLW dump in West Texas.



California has made the most progress of any state toward siting a facility. But in early June, California Senate President Pro Tem. David Roberti announced that he had written to Interior Secretary Bruce Babbitt asking him to delay the transfer of the federal land required for the 1,000-acre site, located in Southern California's Mojave Desert.

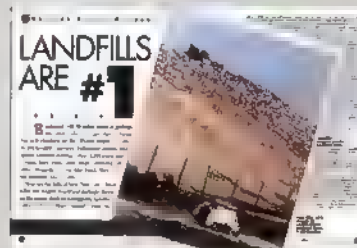
"Landfills Are #1" (Sept/Oct '90)



To protests from both the waste industry and environmentalists, the EPA has delayed the start up date for implementing strict rules that would close the nation's worst landfills.

Environmentalists say delaying the RCRA Subtitle D MSW landfill guidelines means continued risk to those living near leaky landfills. And because sloppy dumps are cheap to run, their continued presence will artificially depress tipping fees, making it hard for recycling to compete.

Mega waste companies dislike the delay because they invested millions of dollars to build highly engineered landfills designed to meet



the fed's impending requirements. They gambled that the new regs would squeeze out marginally capitalized landfill operators, thereby enabling the big boys to dominate the market and jack up tipping fees. One sign of the importance of the Subtitle D rules to the publicly traded garbage companies: When the EPA announced the proposed delay, some securities analysts downgraded their ratings of *WRI* and *WMX* to "sell."

Who *does* like the delay? Municipalities. The substantial financial burden of complying with the rules falls on them.



Less Fat? Aw, Baloney

STUDYING GARBAGE, I'VE LEARNED THIS ABOUT HUMAN NATURE: What we say and what we do are two different things. I could tell you stories, for example, about the difference between what people *report* they eat and drink, and what we *know* they eat by looking at the food debris and packaging in their garbage. Most people misreport their own consumption.

Homemakers, for example, share a foible I like to call the Good Provider Syndrome. Almost uniformly, homemakers report that their families consume considerably more food than garbage sorters can actually find evidence for. Presumably, the homemaker is over-reporting — no doubt unconsciously — in order to demonstrate that the household is amply supplied with life's necessities. Perhaps for a similar reason, homemakers tend to under-report the amount of prepared foods the family uses, and to over-report the amount of fresh produce employed in cooking meals from scratch.

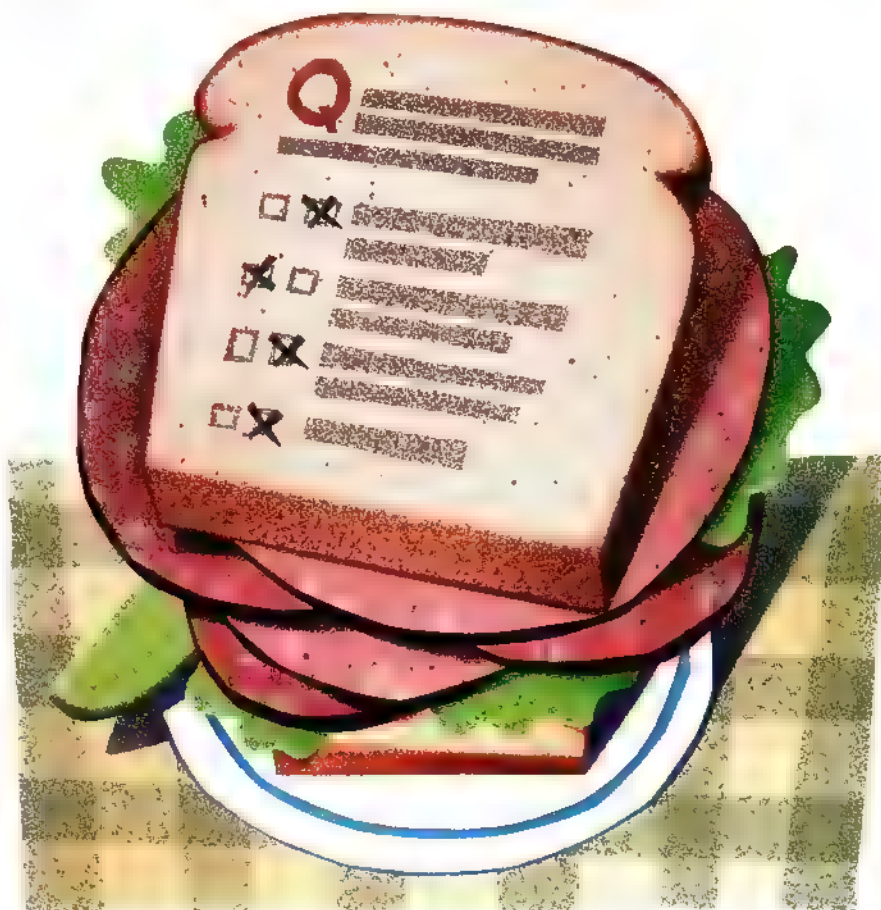
Indeed, pretty much everybody misreports consumption in a similar way: If a food is perceived as unhealthy or socially inappropriate, it is under-reported. If it is perceived as healthy, it is over-reported. The more sharply it is perceived as one or the other, the greater the distortion. Beer, chocolates, and sausages are dramatically under-reported. Asparagus, oranges, and the leanest ground beef are often over-reported by more than 150 percent. Cottage cheese is over-reported by 311 percent!

I used to think that respondents to food surveys were just plain lying. But now I think they — we — are merely fooling ourselves. Really, who remembers exactly how often last year, last month, or even last week he ate what quantities of ground

beef (in hamburgers or Italian meat sauce), or butter (on toast, on vegetables, in a pie crust)? Since survey respondents can't answer food surveys accurately, they try to produce the best information they can, and in this they err toward optimism. As T.S.

Eliot once observed, "Human kind cannot bear very much reality."

Diet researchers will be appalled at my conclusion. How accurate can their surveys be, without an accompanying survey gauging attitudes about food? Not very. Indeed, studies done by the Garbage Project to cross-check data collected by the U.S. Department of Agriculture for its nationwide Food Consumption Survey revealed that much of the information in the government's vaults about food consumption and waste could be said to be on shaky ground. But there may be a silver lining: The misreporting may signal an



intention toward better behavior. Consider my tale about meat fat.

In 1983, the Garbage Project reported that, in the communities where we were studying fresh garbage, the amount of discarded separable fat — that rind around the red muscle — had suddenly doubled. Also, the purchased quantities of fresh beef and pork decreased. What had happened? Well, in 1982 the National Academy of Science published the groundbreaking *Diet, Nutrition, and Cancer*, which pointed to fat from red meat as a risk factor for colon and breast cancer. It seemed people really had gotten the message! But wait...

At the same time, we noted normal quantities of sausage, bologna, hot dogs, and lunch meats, all of which contain non-separable (hidden) fat. In fact, in 1984 the ounces of processed red meat purchased per household per week had actually surpassed the ounces of fresh meat purchased. The result: little change in fat consumption after all.

Had people misunderstood the message? Some people undoubtedly equated "red meat" with steaks, roasts, and chops, rather than with processed meat. (As one acquaintance of mine confidently observed, "If they meant bacon and sausage, they would have said so.") But most people *didn't* misunderstand. At the time, I was exasperated by respondents in our sample who were reporting purchases of processed red meat drastically below those indicated by the empty packages in their trash (which we had their permission to examine). Respondents knew that their consumption of processed meat, too, should be lower, and that's how they reported it. What they said and what they did were very different.

But, ten years later, I've seen the silver lining. In the time since those surveys, Garbage Project studies indicate that purchases of processed red meats have fallen, often precipitously, even though processed meat is relatively cheap and easy to prepare. People still under-report, but not to the extent they used to. Maybe it just takes a little time for that inner, optimistic voice to talk us into being good.

Archaeologist Dr. William L. Rathje is founder and director of the Garbage Project, and professor of anthropology at the U. of Arizona-Tucson.

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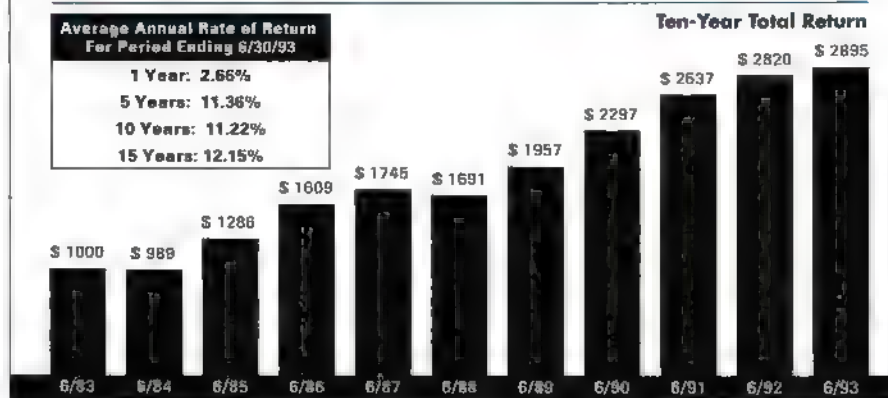
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**SCAM OR CRISIS? SOMEWHERE BETWEEN
CAMP APOCALYPSE AND CAMP HOGWASH
LIVES THE NOT-SO-SIMPLE TRUTH. THE REAL
CRISIS HERE IS OUR GULLIBILITY**

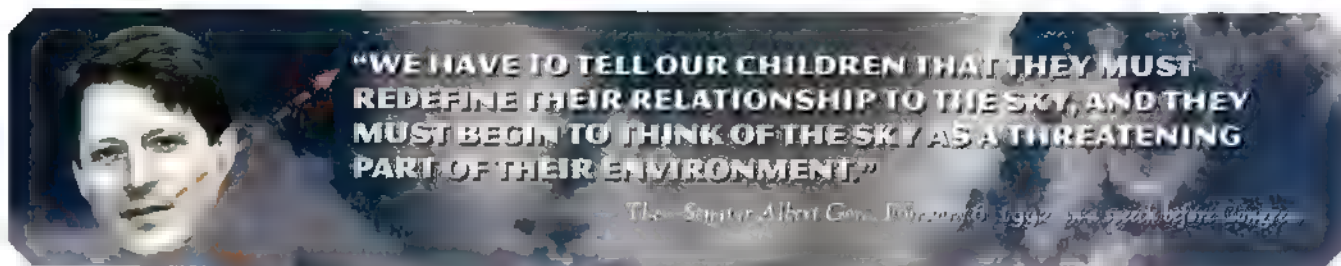
BY PATRICIA POORE & BILL O'DONNELL

PHOTOGRAPHY BY BRIAN SMALE

No journalistic "lead" for this story. No weary scientists peering through the frozen antarctic mist after a rest-
less night spent dreaming of blind rabbits. No international chemical industry conspiracies. We won't try to
hook you. We won't promise an easy read, either. But we will try to remain neutral, even as we suggest that
conventional wisdom may be deeply flawed. • We have spent the better part of two months deeply engrossed
in the literature of ozone depletion. Our editorial interest had been aroused by the recent popular books
which present vastly different interpretations of science. We moved on further with the original scientific
papers of Dobson, Rowland and Molina, Teramura, et al. We then read expert reviews of the literature by
Hansen, Singer, et al. • We found compelling arguments on both sides, only to find credible contradictory
information in the next day's reading. But we were given up from anything resembling a final conclusion elude
• • • Although the science around ozone depletion is a conundrum, it is as yet incomplete mosaic of pos-
sibilities. Conflicting science and media hype have transformed the argument into a battle between phile-
sophical camps: Camp Apocalypse and Camp Hogwash. We may be accused of adding to the confusion
by presenting both sides of the argument, but that is really no choice. The escalating volley
of charges and countercharges has become a shouting match, and a growing tendency to be
overly confident about the "doomsday" prediction that this trend will be
continued by the National Academy of Sciences and Vice President Al Gore, author

ONE

[illegible]



as (a) the so-called ozone hole is an ephemeral disturbance over a mostly unpopulated area; (b) ozone thinning over populated latitudes, if it exists, is within the range of natural fluctuation and is seasonal; (c) no documentation exists for actual sustained increase in uv-b radiation at ground level.

We believe, however, that there may be cause for concern. We are skeptical of the debunkers' claims. No, it is not chlorine from oceans and volcanoes which is responsible for creating the effect seen in the polar region; yes, chlorine from cfc's does apparently make it to the stratosphere and does destroy ozone.

We consider the lack of disclosure and debate regarding the real costs of a precipitous halocarbon phase-out to be near-criminal. The costs that will be involved (monetary, opportunity, and human) receive scant coverage, in spite of the fact that the "threat" of ozone depletion is demonstrably lesser than any number of real threats both worse in scope and more immediate.

WHAT WAS THE QUESTION?

LET'S REVIEW BRIEFLY THE POINTS OF DEBATE, BOTH TO DEFINE THE scope of our discussion and to inform those who have not been reading carefully the science sections of newspapers in the past four years.

A theory advanced in 1973 by F. Sherwood Rowland and Mario Molina (Univ. of California-Irvine) holds that chlorofluorocarbons (cfc's) and related molecules, owing to their tremendous stability, eventually reach the stratosphere and, photolyzed by intense ultraviolet radiation, split to release energized chlorine atoms that then destroy ozone (O₃) molecules. Obviously, O₃ is always being created and destroyed, but it is thought that the increased destruction from man-made chemicals has tipped the balance and caused a temporary net depletion in the O₃ concentration. This is potentially harmful because O₃ is one mechanism that controls the amount of uv-b radiation reaching the biosphere. (uv-b is an ultraviolet wavelength that affects the body, in ways that are both life-sustaining and, in excess, damaging.)

The "ozone hole" is the graphic name given to a phenomenon that so far exists only seasonally over the Antarctic region; namely, a thinning of the concentration of O₃ molecules that represents a depletion of up to two-thirds for a limited amount of time. Scientists on all sides of the debate agree that preexisting conditions unique to the Antarctic zone create the possibility of the "ozone hole."

Those scientists and politicians calling for an immediate

cfc ban believe that very recent minor, unsustained, localized depletion of ozone in the stratosphere in some areas outside the polar regions is caused by cfc's, and is a harbinger of increasing future depletion. The issue was presented strongly enough that a phase-out was planned in 1987 in an international treaty called the Montreal Protocol; the dissemination of certain findings since that time resulted in a decision for a near-total ban by 1996.

In the meantime, a strong counterpoint to the ozone theory and the proposed ban has been presented, which many people refer to as a "backlash." Regardless of the personal political motivations of the skeptics, good reasons for this "backlash" include the discovery of information suppressed in the politicking for a ban, as well as a growing realization of the extraordinary costs inherent in phasing out the relatively safe, useful and ubiquitous chemicals.

POINTS OF CONTENTION

EACH CAMP PURPORTS TO INTERPRET THE ORIGINAL DATA. ONLY SINCE the publication of the popularized books, or since about 1989, has the debate escalated into a war, with each side battling the other point by point. Let's look at Camp Apocalypse first, as it gained favor earlier and still holds sway. Here are their major points:

- (1) cfc's, hcfc's, and halons are proven to be responsible for a sudden (in a 40-year period) depletion of stratospheric ozone, which created the "ozone hole" over Antarctica. The effect of cfc's on the stratosphere will lead to a similar hole over the Arctic, and will change the ozone layer over populated areas for at least 100 years, even with a phase-out and ban.
- (2) The "ozone hole" gets worse every year, starting sooner or growing in area or breaking up later.
- (3) Ozone loss causes increased uv-b at ground level, which has resulted in severe sunburns and will cause increases in skin cancer, cataracts, and immune deficiency.
- (4) Increased uv-b at ground level will affect the food chain, from phytoplankton to soybeans, and may have apocalyptic results.

As you can see, their points are a mix of the known and the projected. Context is often missing from the arguments of both camps, as well. For example, saying "the ozone hole gets worse every year" sounds definitive (and terrifying), but the period referred to is only 14 years — an insufficient baseline from which to chart real deviation. Now, the salient points from Camp

¹ *The Holes in the Ozone Scare/The Scientific Evidence That the Sky Isn't Falling* by Roger A. Maduro and Raf Schauerhammer. 21st Century Science Associates, Washington, D.C., 1992. *Ozone Crisis/The 15 Year Evolution of a Stubborn Climate Emergency* by Sharon Riechman. Wiley & Sons, New York, 1990. *Trading in Planet: How Science Can Help Us Deal with Acid Rain, Depletion of the Ozone, and Nuclear Waste* (Among Other Things) by Dixey Lee Ray with Lou Guzzo. Regnery, New York, 1990. *Earth in the Balance/Ecology and the Human Spirit* by Al Gore. Houghton Mifflin Co., Boston, 1992. ² *Eco Scam/The False Prophets of Ecological Apocalypse* by Ronald Bailey. St. Martin's Press, New York, 1993.

Hogwash, themselves a mixture of red herrings and truth:

- (1) cfc's are heavier than air and therefore can't get up into the stratosphere.
- (2) In any case, chlorine from cfc's pales in comparison to chlorine released by the oceans and volcanic eruptions.
- (3) There has always been an ozone hole, we just didn't know how to look for it.
- (4) There is no longterm "thinning" of the ozone layer.
- (5) The relationship between stratospheric ozone concentration and uv-B at ground level is unknown, and no sustained increase in uv-B at ground level has been demonstrated.

BOTH CAMPS BRING UP THE SAME TOPICS; ONLY THEIR conclusions differ. Let's look at those topics, one by one, with a more neutral perspective, based on a reading of both and reference to some of the original documents.

THE OZONE HOLE

THE ARGUMENT REGARDING WHETHER OR NOT THE "OZONE HOLE" existed before cfc's remains murky. The question, apparently, is what did ground-breaking researcher Gordon Dobson really find when he examined ozone concentration in the 1950s (i.e., before the proliferation of cfc's). Did he discover the ozone hole or not? Some in the hogwash camp have publicly asserted that Dobson found ozone levels as low as 150 Dobson Units over Halley Bay [on the Antarctic continent at approx. 75° S].

We looked it up ourselves. Here is Gordon Dobson reviewing his findings of the late 1950s in a paper written for *Applied Optics* in March 1968 — long before the controversy erupted.

"One of the more interesting results on atmospheric ozone which came out of the IGY [International Geophysical Year] was the discovery of the peculiar annual variation of ozone at Halley Bay. The annual variation of ozone at Spitzbergen [a Norwegian Island at approx. 80° N.] was fairly well known at that time, so, assuming a six months difference, we knew what to expect. However, when the monthly telegrams from Halley Bay began to arrive and were plotted alongside the Spitzbergen curve, the values for September and October 1956 were about 150 units lower than we expected. [our emphasis] We naturally thought that Evans had made some large mistake or that, in spite of checking just before leaving England, the instrument had developed some fault. In November the ozone values suddenly jumped up to those expected from the Spitzbergen results. It was not until a year later, when the same type of annual variations was repeated, that we realized that the early results were indeed correct and that Halley Bay showed most interesting difference from other parts of the world. It was clear that the winter vortex over the South Pole was maintained late into the spring and that this kept the ozone values low. When it suddenly broke

up in November both the ozone values and the stratosphere temperatures suddenly rose."

So, while Dobson's group didn't find levels as low as those measured in the mid 'eighties, it's clear from his language that he was shocked at how low ozone concentrations were over Halley Bay, and at a loss to explain how such a phenomenon could exist. Whether or not the "hole" (that is, levels as low as 150 D.U.) is a recent occurrence, it is clear that the physical environment particular to Antarctica had depleted ozone in the austral spring before cfc's could be credibly implicated.

Dobson's group didn't have converted spy planes, high-tech satellite imagery, and countless researchers available to them. They had one instrument in one place. Today, we see the exact position of maximum ozone depletion shifting location from year to year. Could it be that Halley Bay was outside of the "hole" in '56 and '57? We can never know.

CAN CFCs MIGRATE TO THE STRATOSPHERE?

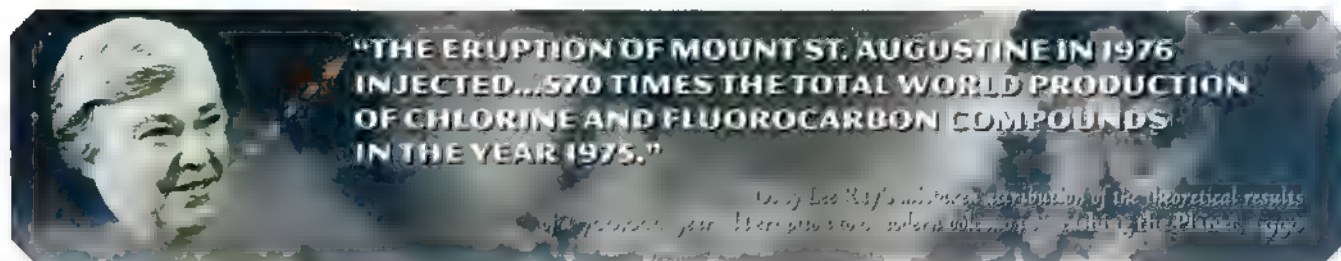
"CFCs ARE MUCH HEAVIER THAN AIR, AND SO COULD NEVER REACH the stratosphere." It is clear to us that this is a bogus argument. While it's true that cfc's weigh anywhere between four and eight times as much as air, and will sink to the floor if spilled in a laboratory, in the real world, they won't stay on the ground. Our atmosphere is a very turbulent place. Says Rowland: "The atmosphere is not a quiescent laboratory and its mixing processes are dominated to altitudes far above the stratosphere by the motions of large air masses which mix heavy and light gaseous molecules at equal rates. Throughout most of the atmosphere, all gaseous molecules go together in very large groups, independent of molecular weight."

"By 1975, stratospheric air samples . . . had been shown regularly to have cfc-11 present in them. During the past 17 years, cfc-11 and more than a dozen other halocarbons have been measured in literally thousands of stratospheric air samples by dozens of research groups all over the world."

WHAT ABOUT NATURAL SOURCES OF CHLORINE?

SAY THE SKEPTICS: "THE AMOUNT OF CHLORINE HYPOTHETICALLY released by cfc's pales in comparison to that available from natural sources." They are talking about seawater evaporation and volcanoes. Dixy Lee Ray tells us in *Trashing the Planet*: "The eruption of Mount St. Augustine (Alaska) in 1976 injected 289 billion kilograms of hydrochloric acid directly into the stratosphere. That amount is 570 times the total world production of chlorine and fluorocarbon compounds in the year 1975."

The hogwash camp has said that one billion tons of chlorine are released into the atmosphere from natural sources, as compared



to a theoretical 750,000 tons from man-made sources. Taken at face value, these seemingly scientifically arrived-at proportions would lead one to believe that man-made sources are insignificant.

Most unfortunately for the hogwash camp, Ray had made a terrific blunder. Her calculation came not from Alaska in 1976, but from a theoretical extrapolation of the total HCL released (not necessarily reaching the stratosphere) by a mammoth eruption 700,000 years ago. She may have made the same argument (which rested on a 1989 paper by Maduro) even with accurate numbers, but noise over the mistake has eclipsed the question.

Indeed, what about volcanoes, spewing chlorine compounds at high velocities? Again, the amount released by volcanoes is not the same as the amount reaching the stratosphere. Yet Maduro insists: "No matter what figure is used, the basic point remains that the amount of chlorine emitted by Mother Nature through volcanoes dwarfs the amount contained in man-made CFCs."

Ozone-depletion researchers counter that whatever the amount of chlorine compounds released through natural sources, all of it is washed out in the lower atmosphere through precipitation — before it has reached the stratosphere.

In summary, the hogwash camp is vastly overstating the importance of natural sources of chlorine. The apocalyptic camp entirely dismisses the importance of natural sources of chlorine because it is removed by rainfall, with negligible amounts reaching the stratosphere.

Whom to believe? Is it really true that only organic, water-insoluble compounds (e.g., CFCs) can deliver chlorine to the stratosphere? Are we really to believe that there's enough precipitation in the antarctic night to wash out all the chlorine being emitted by Mount Erebus (a volcano, continuously active since 1972, six miles from the monitor station at McMurdo Sound) — before any of it can move up to the stratosphere in the great, turbulent polar vortex?

GLOBAL OZONE DEPLETION? FROM WHAT BASELINE?

FOR THE RECORD, NO SOLID EVIDENCE EXISTS TO SUGGEST OZONE DEPLETION over the northern latitudes poses any health hazard. Are you shocked? It's no wonder. Environmental groups and the popular press tell us the threat is now.

Case in point: On February 3, 1992, NASA "interrupted their research" to announce their prediction of a full-scale ozone hole over much of the U.S. and Europe: the infamous "hole over Kennebunkport" referred to by then-Senator Al Gore. It didn't happen. The October 1992 Greenpeace report entitled *Climbing Out of the Ozone Hole* claimed: "The formation of an ozone hole over the Northern Hemisphere in the near future, and possibly as ear-

ly as 1993, now appears inevitable." Greenpeace's "inevitable hole" over the Northern Hemisphere didn't materialize, either.

That the alarms were false didn't stop them from becoming common knowledge. The July 1993 issue of the women's fashion magazine *Vogue* tells us that "thorough sun protection is the cornerstone of any summertime beauty strategy. As government scientists report ozone over the Northern Hemisphere is at its lowest level in fourteen years." The ominous warning appears in a feature article called "Beauty and the Beach," which shows page after page of bathing beauties soaking up the summer sun in the latest bikinis.

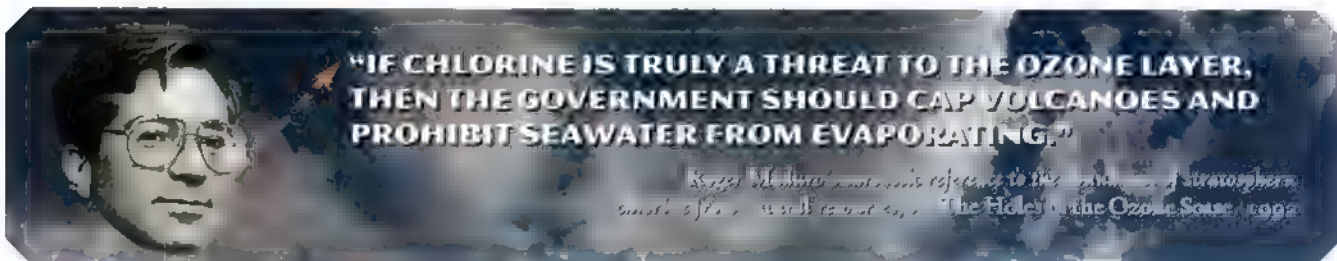
What the article fails to mention is that the 10 to 15% reduction government scientists reported occurred in March and April, when the amount of UV-B reaching the northern latitudes was but a small fraction of what the summertime sun delivers. We have to be careful when we interpret these diminished percentage-point results. A ten percent depletion over Kennebunkport in April (and its corresponding as-yet theoretical increase in UV-B) is still but a small fraction of that received in New York or Boston in June — when people really are out on the beach. We also must be careful to understand what baseline is being used to to report these "depletions."

Of those who either discredit the degree of ozone thinning or differ on its range of effects, few carry greater weight or generate more controversy than S. Fred Singer, who holds a doctorate in physics from Princeton University and is now president of an Arlington, VA-based think tank called Science and Environmental Policy Project.

Dr. Singer is skeptical about claims by other scientists that, on average, global ozone levels are falling: "One cannot estimate whether there has been any long-term change from short-range observations because the natural fluctuations are so large." According to Singer, long-term analyses are compounded by daily ozone fluctuations that double naturally from one day to the next [without any cataclysmic outcome, by the way]. "Seasonal fluctuations, from winter to summer, are as much as 40% and the eleven-year solar cycle is three to five percent, on a global average. Extracting long-term variations from a few percentage points of change in a decade is like observing temperatures for one season and judging whether climate has changed over the long term. It can't be done.

"It is not possible to eliminate the chance that what we are seeing is a natural variation.

"The Antarctic hole is a genuine phenomenon," Singer concedes. "But it is nothing much to worry about because it lasts such a short while and has already stabilized. Besides, it is con-





"THE TEMPTATION OF WESTERN LEADERS TO SEE SUBSTITUTES ON THE MARKET BEFORE OUTLAWING CFCs MAY DELAY GLOBAL ACTION."

Sharon Roan suggests we delay the Ridge until the Ozone Crisis, 1989

trolled more by climate than by cfc's."

THE UV-B QUESTION

THE SCARY PART OF OZONE DEPLETION IS, OF COURSE, THE CORRELATION to increased uv-b penetration. The most often-cited theoretical relationship is that for every 1% decrease in stratospheric ozone, we can expect a 2% increase in ground-level uv-b. It would seem a good check of diminishing ozone claims would be to quantify the penetration of uv-b. Problem is, the few who are looking can't find any increase at the Earth's surface.

Despite the analysis of TOMS (Total Ozone Mapping System) satellite data released by former EPA-administrator William Reilly indicating *springtime* average ozone levels over the United States have dropped 8% in the last decade, there are no data to suggest increased penetration of uv-b on the ground. In fact, a report published in the September 28, 1989, issue of *Nature* cites a study that found a 0.5% average decrease in uv-b between 1968 and 1982, despite an overall decrease in ozone column density of 1.5% over the same period.

Ozone doomsayers counter by arguing: 1) The monitors used are not capable of making distinctions between uv-a and uv-b radiation, and 2) uv-b is not reaching the surface because it's being absorbed in the troposphere by man-made pollutants. They reason that we shouldn't count on our fouling of the lower atmosphere to protect us from damage we're inflicting above.

If the monitors are antiquated, you'd think we'd be funding new ones, given our fear of the sky. The second argument is a red herring. The reported 8% depletion in stratospheric ozone (which should theoretically create a hard-to-miss 16% increase in uv-b) occurred during a decade when tropospheric pollution was decreasing over the U.S. — courtesy of the Clean Air Act.

THE CONNECTION TO HUMAN HEALTH All claims regarding human health risks associated are related not to ozone thinning *per se*, but to increased uv-b exposure. So far, researchers have not in fact tied increases in skin cancer and cataracts to increased uv-b exposure due to thinning ozone. There is no epidemiological evidence of suppressed immune function due to uv-b exposure caused by thinning ozone.

(No one questions that people get more uv exposure than in the past. Only a few generations ago, a tan was considered unhealthy. Only since the 1950s have so many people had the leisure and desire to be out in the sun, wearing scant clothing. And only with technological advances have so many white people been living in previously inhospitable "sunbelts.")

But is there more uv-b, overall, sustained, at ground lev-

el? What would it mean if we can find ozone depletion without a corresponding rise in uv-b penetration to ground level?

WHERE WE ARE — AS OF AUGUST '93

PUBLIC POLICY IS DRIVEN BY THE PUBLIC, NOT BY SCIENTISTS. A recent survey gave these results: 67% of Americans consider themselves "extremely concerned about the environment." But only one in five is aware that cfc's are used in refrigeration, and only one in 30 is aware that cfc's are used in air conditioning. Are a well-meaning public and the politicians who serve them not well enough informed to make global decisions that will cost hundreds of billions of dollars? Will future generations look back at the "ozone crisis" as the greatest waste of resources in human history? Or will they thank us for taking lifesaving action without delay? (The apocalyptics talk about political foot-dragging "for 14 years," but the Montreal Protocol is perhaps the fastest, largest non-military global response to a perceived threat in human history.)

The following observations are based not on our own scientific experiments, of course, but rather on a rational analysis of the facts following a great deal of reading. We have no vested interest in either camp.

1. Attributing the Antarctic "ozone hole" to cfc's is overstatement to the point of fallacy. Natural conditions have always existed which deplete the concentration of ozone in that region during a specific time of year. However, scientific data do support the theory that stable, man-made chlorinated molecules are implicated in a localized net ozone loss during the natural cycle.

2. Ozone depletion is not an epic crisis. Remember, even if ozone maintains 100% of its "normal level," skin cancers will still occur. On a day when ozone levels over Punta Arenas, Chile, are reduced by 50% because of the "hole," the theoretical maximum increase of uv-b levels would be equal to only 7% of what reaches the ground at the equator on the same day.

3. We must monitor uv-b at ground level to see if in fact there is any correlation with stratospheric ozone fluctuations.

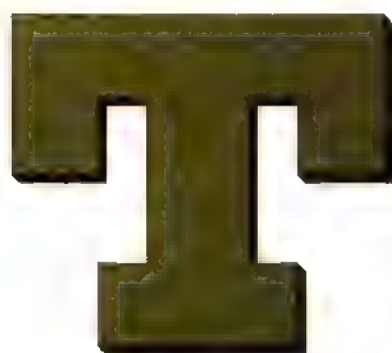
4. A outright ban on cfc's and other useful halocarbons (before adequate substitutes are available) would cause more human suffering and economic mayhem than the theoretical increase in ozone depletion under a more managed phase-out. In the U.S. we have the financial means and perhaps the political will to accept the challenge — albeit at tremendous cost and lost opportunities. In other parts of the world, an already insufficient supply of affordable refrigeration would be exacerbated. The result will be more disease from food-borne bacteria, and greater hunger.

What do you think?



An Inside Look at

It's not as simple as slice, dice and presto! — recycled paper. But the technology is coming and consumer demand is surprisingly very high.



THIS IS A STORY ABOUT PAPER. Like any product, paper is the end result of a manufacturing process that consumes energy and natural resources, and leaves a residue of pollution. It goes against common sense to bury all of that accumulated value in a landfill after a single use. The goal of paper recycling — if not always the immediate reality — is to conserve resources and get the highest return from the resources society invests in making paper. Common sense does not necessarily prepare us, however, for understanding the complications inherent in the move toward post-consumer recycling. Bundling newspapers does not make recycling happen. Nor is it merely a question of getting the “recycled paper machine” on line. Here we present current thinking on four newsworthy topics and provide sources for paper products with high recycled content.

Even while conceding that paper recycling is fraught with technical and market complications, it does make sense.

IT CONSERVES LANDFILL SPACE. REGARDLESS OF YOUR OPINION ON THE severity of the “landfill crisis,” there is no question that it will cost more to dispose of trash in the future. Reduction through recycling addresses that issue. More than any other category of consumer products, paper recycling will extend landfill capacity.

Taken together, paper and paperboard is the largest single component of municipal solid waste, amounting to more than 40 percent of the volume in landfills. (Newspapers alone account for about 13 percent of landfill space. Paper in packaging takes up about 15 to 20 percent.) If you want to slow the flow of garbage into landfills, recycling paper is the obvious place to start.

We know it's effective: Excavations at four landfills in the greater Toronto area by the University of Arizona's Garbage Project showed that Toronto's curbside recycling effort cut the volume of newspapers flowing to dumps in that city from 12.9 percent of total MSW to 6.7 percent — a 50 percent reduction. (See “Beyond The Pail,” May/June '92.)

In the U.S., 33.1 million tons of paper will be landfilled this year, according to the American Forest & Paper Association. But 36.7 will be recovered, marking the first time that more paper will be recycled than landfilled.

IT “SAVES TREES.” According to the U.S. Forest Service, over 25 percent of the trees logged in the U.S. go to make paper and paperboard. Although papermaking will always

require cutting some trees, recycling has the potential to reduce demand for virgin wood fiber.

Trying to figure out *exactly* how many trees are saved by recycling paper is, at best, difficult. To arrive at a statistic like the over-quoted “recycling one ton of paper saves 17 trees” requires making a series of assumptions: How tall and how wide are the trees? Are they hardwoods or softwoods? Is the paper made using a groundwood pulping process, which gets a higher yield of pulp per tree, or chemical pulping processes?

The number of trees saved by recycling one ton of virgin paper is probably best expressed as a range. According to *Recycled Paper: The Essential Guide* by Claudia Thompson (MIT Press), reasonable technical assumptions work out to 17 to 31 trees per ton for printing and writing papers. Martin Blick, manager of manufacturing projects with the publications paper division of Champion Paper, sets the range at 10 to 31 trees.

The number-of-trees-saved argument is, of course, something of a red herring. People in the paper industry point out that over half the trees used in papermaking are taken from privately owned forests which the paper companies either replant or allow to grow back, encouraging only the desired tree species by spraying herbicides to destroy the ones they don't want. Ecol-

**STORY BY ETHAN SEIDMAN,
BILL BREEN AND PAUL BOTTS**

**PHOTOGRAPHY BY
Sharon White & Bob Packert**

Paper Recycling



ogists argue that repeated cutting and replanting (especially clearcutting) depletes the soil and results in "monospecies" forests that cannot support the same diversity of wildlife as native forests. Nevertheless, the trees are grown for harvesting; less demand would not necessarily return acreage to climax forest.

"We are not talking about the rain forest or old growth in the Pacific Northwest," says Champion's Martin Blick. Most of the trees cut for paper come from fifth or sixth generation pulpwood forests." The wood-products industry dubs these types of forests "tree plantations" — in other words, tree farms.

"When you harvest these trees the number of acres of forest is not changed," Mr. Blick continues. "You're just changing the average age and size of trees on those acres."

IT PROMOTES A CLEANER MANUFACTURING PROCESS. Producing recycled paper results in less pollution than virgin papermaking and uses less energy. While direct comparisons of energy use are more difficult to quantify with recycled paper than, say, aluminum recycling, comparisons of other aspects of the manufacturing process are clear cut. Take air pollution.

"Virgin kraft paper mills emit sulfuric acid and other reduced sulfuric compounds, acetone and methanol, and chlorinated compounds, among other air pollutants," notes Alex Sagaday, director of environmental and occupational health with the Michigan chapter of the American Lung Association. "They are a significant stationary source of air pollution."

The virgin papermaking process inherently involves burning by-products, which results in air emissions. On the other hand, air emissions associated with recycled paper come solely

from the fuel used to power the plant.

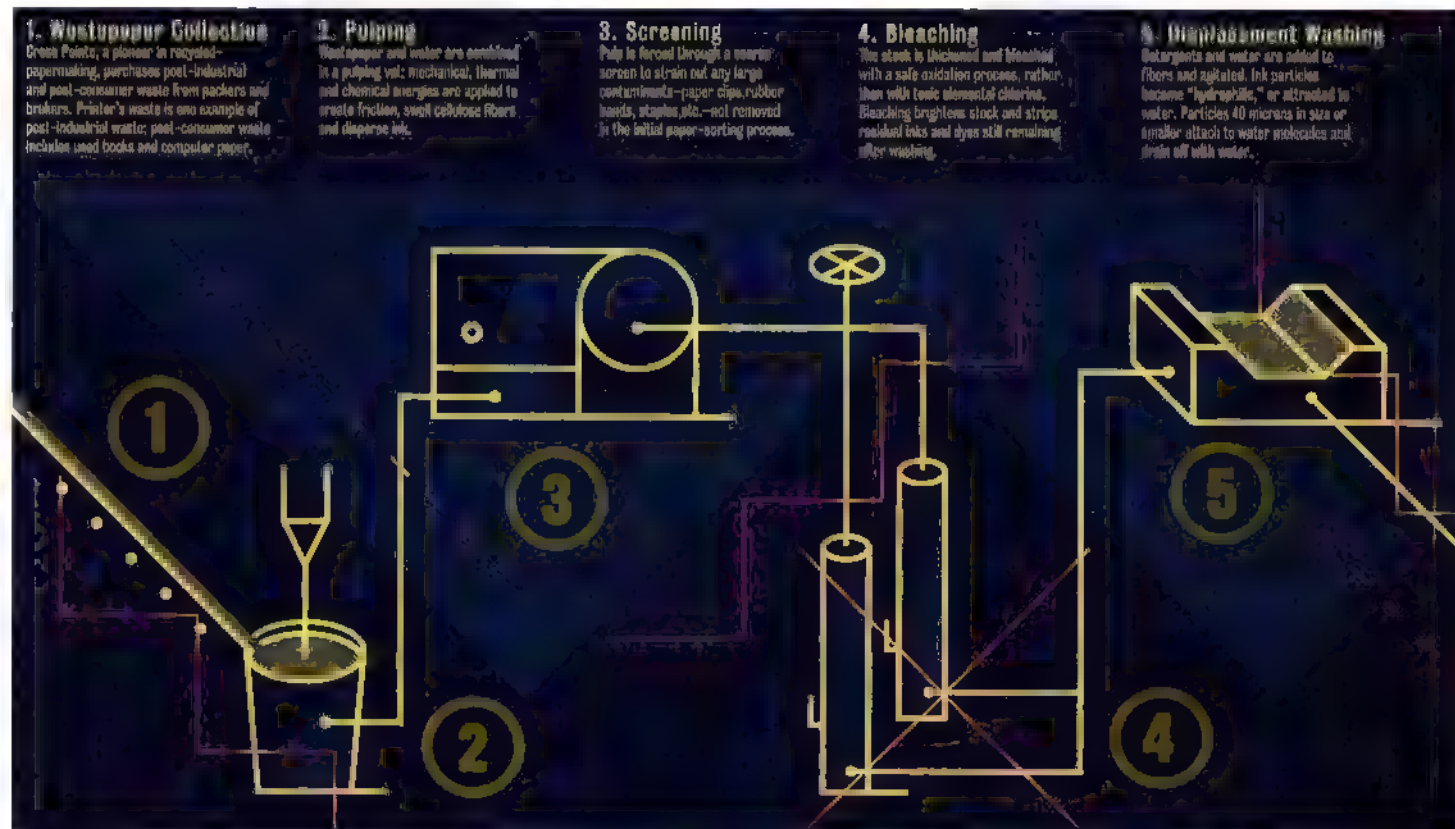
A 1974 EPA study reported that producing 1,000 tons of deinked and bleached recycled pulp released 60 percent fewer pounds of air pollutants than would have been released by producing an equivalent amount of virgin bleached kraft pulp. Air pollution regulations have become more stringent since then, and over the years the industry has spent millions of dollars to comply with the Clean Air Act — \$489 million in 1991, according to the 1993 *North American Pulp & Paper Factbook*. Nevertheless, despite increased spending and advances in modern pollution-abatement technology, manufacturing virgin paper still creates more air pollution than manufacturing recycled paper.

Regarding sludge: Making recycled paper does have some environmental consequences that virgin-paper production doesn't. Most wastepaper that is recycled must be "deinked," a process that removes ink, fillers, and coatings from the paper. (See "The Recycled Paper Trail," below.) Deinking deposits a sludge of nonreusable cellulose fibers, calcium carbonate, clay, and the staples, rubber bands, banana peels, and other contaminants that show up in post-consumer wastepaper.

Previously, some types of printing inks had high levels of heavy metals such as lead and cadmium that would concentrate in deinking sludge. Over the past 15 years, however, the printing-ink industry has taken great strides to reduce those levels, and heavy-metal concentrations are no longer a significant problem in deinking sludge.

"In terms of heavy metals, deinking sludge is much cleaner than most [secondary] municipal sewage sludge," says Mahen-

THE RECYCLED PAPER TRAIL



dra Doshi, technical editor of the trade quarterly *Progress in Paper Recycling*. "Volume, however, is a significant factor." For example, deinking at Cross Pointe's Miami, Ohio, mill results in 22 pounds of sludge for every 100 pounds of wastepaper recycled.

Most mills dispose of their sludge in private landfills, though some get permission to use municipal sites. Other mills incinerate sludge, resulting in some air emissions. Occasionally, mills are permitted to apply the sludge as a soil amendment to eroded fields and farmland. —B.S.

With no legal standards to define recycled paper, comparison shopping means giving yourself an education. What should "recycled" mean?

THERE ARE NO NATIONAL, LEGALLY BINDING STANDARDS AND definitions for recycled printing and writing paper. When corporate purchasers (or individual consumers) commit to buying "recycled paper," they must master a confusing jumble of jargon. The definition vacuum also means that some paper companies can market "recycled paper" that consists of mostly virgin pulp, pre-consumer fiber they might have utilized anyway, and piddling amounts of post-consumer content. ("Post-consumer" refers to wastepaper that has been used by a consumer and discarded. "Pre-consumer" refers to wastepaper generated in mills as part of the papermaking process, such as cuttings, scraps, and flawed batches. These fibers have always been used by paper companies to make paper.) Uncertainty surrounding which definitions of recycled paper the public will accept contributes to reluctance on the part of paper companies to plan multi-million-

dollar capital investments in deinking machinery.

The federal government is the largest single buyer of printing and writing paper, consuming two percent of the entire market. (The Government Printing Office, for example, bought 39 thousand tons of paper in 1992.) Because it uses so much paper, the purchasing guidelines and definitions the Fed applies to itself often become *de facto* national standards.

The EPA's current printing and writing paper guideline — "50 percent recycled fiber" — does little to make things clearer for the consumer. Recycling advocates contend that paper mills can take the pre-consumer waste they might have used anyway, put it all into a single brand to meet the 50 percent recycled content requirement, and market the result as "recycled paper."

The paper industry counters that the EPA's current 50 percent recycled fiber standard is too stringent because it discourages large-scale mills (generally defined as those producing 200-plus tons per day) from entering the recycled-paper market. Why? Roughly 90 percent of the wastepaper generated at mills is already being used. If more than a few large mills tried to meet the current standard by using pre-consumer waste, it would result in an expensive bidding war for the stuff, which would drive up production costs. The big mills could try to reach the 50 percent standard using high levels of post-consumer wastepaper. That, however, would require investments of tens or even hundreds of millions of dollars in new deinking equipment.

"As a company that has large paper machines, we are dominated by fixed labor, maintenance, and capital depreciation costs," says Martin Blick of Champion Paper. "We are going to pay for the kraft [virgin] paper process whether we do it or not, so it's horribly expensive for us to use 50-percent recycled content."

6. Flotation

Air, foaming agents and chemicals are mixed into pulp to make ink "hydrophobic," or repelled by water. Ink particles 40 microns in size or larger attach to air bubbles and float to the surface for removal.

7. Centrifugal/Reverse Cleaning

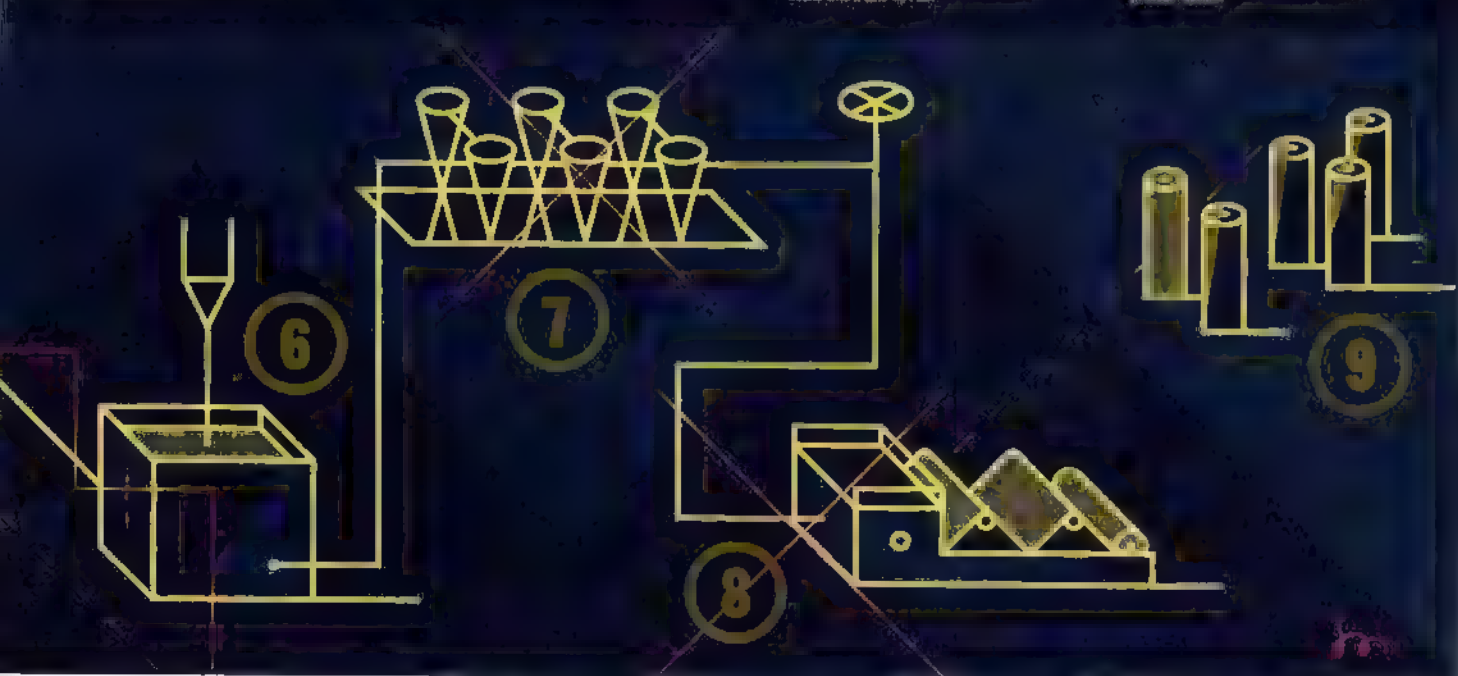
Pulp is spun at high speed to remove lightweight contaminants such as synthetics and "shingles," i.e., hot-melt glues used in bookbinding, box construction, etc.

8. De-Inked Pulp

The pulp goes into storage or onto the paper machine. Pulp on the paper machine is spread onto a moving wire screen. Water drains out and pulp forms a sheet; the sheet is then transferred to pressing machines and wound onto a take-up roll.

9. Printed-Pieces

Finished paper is specified by design professionals and used to create premium printed materials: brochures, annual reports, books, newsletters, etc. After use, materials are recycled (see Step 1) and the process repeats.



THE RECYCLED OFFICE

RECYCLED CONTENT, PAPER now exists for virtually every personal, office, and printing application. The cost differential between virgin and recycled is beginning to close as well. Steady demand for recycled products encourages industry investment in paper collection and deinking facilities.

Direct Suppliers

Conservatree Paper Company, 10 Lombard St., Suite 250, Dept. GM, San Francisco, CA 94111, (800) 522-9200.

A paper distributor (not a direct retailer), Conservatree sells a wide range of recycled papers appropriate for office use. Minimum order: \$100.

Earth Care Paper

P.O. Box 7070, Dept. GM, Madison, WI 53707, (608) 223-4000.

Offers a full line of recycled office paper including legal pads, "repositionable" (Post-It style) note pads, and green-bar computer paper.

Esselte Pendaflex Corporation

7 Clinton Road, Dept. GM, Garden City, NY 11530, (800) 645-6050.

Sells the Earthwise line of recycled paper products through retailers and via mail order. Focuses on file folders, report covers, expanding files, etc.

Hudson Envelope/Jam Paper

111 Third Avenue, Dept. GM, New York, NY 10003, (212) 473-7300.

Carries a complete line of good-looking envelopes of all sizes made with 100% post-consumer content.

Real Recycled

Dept. GM, 1541 Adrian Road, Burlingame, CA 94010, (415) 333-5335.

A recently formed mail-order retailer serving individuals and commercial users. Sells recycled products only. Their 100% post-consumer line includes loose-leaf binders and filler paper, continuous form printer paper, record storage boxes, magazine storage boxes, steno notebooks, and more. Also carries copy paper ranging from 30% to 60% post-consumer. Catalogue available.

Quill

P.O. Box 4000, Dept. GM, Lincolnshire, IL 60469, (708) 634-4800.

The nation's largest mail-order distributor of office products, Quill has a special catalogue devoted entirely to recycled products. The norm is 50% recycled with 20% post-consumer content, but higher levels can sometimes be found. The company guarantees that the recycled products will cost the same or less than comparable non-recycled alternatives.

Weisenbach Specialty Printing

342 S. Washington Ave., Dept. GM, Columbus, OH 43215, (614) 483-8000.

Prints logos, letterhead, slogans, etc., on a wide range of recycled office products. Their 100% post-consumer line includes business cards, envelopes, notepads, and letterhead. Catalogue available. Minimum orders: somewhat flexible, but usually in the neighborhood of 500 pieces.

Where to Buy

The following three paper companies make excellent office printing and writing papers with high levels of post-consumer content. Consumers can't buy directly from paper mills, so contact them to find out who distributes their paper in your area.

Cross Pointe has been making recycled paper for over 75 years. (The paper you are reading this on is made by them with 100% total recycled fiber, including at least 15% post-consumer content.) They market a wide array of office-grade papers with high post-consumer content. (800) 543-3200.

Hammermill Paper markets the Unity DPL line of business copy paper made solely from deinked newspapers and magazines with at least 50% post-

consumer content. Consumer help line: (800) 437-2145.

James River took the leap and invested in new deinking facilities. As a result, they now market the Eureka line of high-quality office papers with high levels of post-consumer content, available primarily in the West. (800) 322-2800.

For More Information

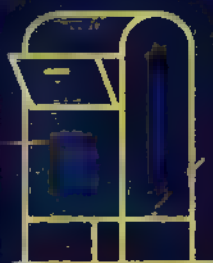
American Recycling Market, Inc., P.O. Box 577, Ogdensburg, NY 13669, (800) 267-0707.

A.R.M. publishes "The Official Recycled Products Guide," the most comprehensive guide to sources of recycled products. The same company also publishes a recycled products newsletter, "The RPG Reporter." One copy of the guide costs \$155 ppd. A subscription to the newsletter is \$75 ppd.

Californians Against Waste Foundation

926 J Street, Suite 609, Sacramento, CA 95814, (916) 443-8377.

CAWF publishes "Buy Recycled: The Business and Government Buyer's Guide to Recycled Products," which lists more than 450 recycled products (not all of them paper) and where to get them in California. Also includes answers to frequently asked questions about cost, quality and availability. \$22.95 ppd.



Consequently, most big-machine mills don't make recycled printing and writing paper. But things may soon change, indeed may have changed already: The **EPA** is planning to issue new guidelines sometime around the end of the year. In addition, the Clinton Administration is expected to issue an executive order on government purchases of recycled products. As this issue of **GARBAGE** went to press, the order was due out in early August.

The upcoming revisions have occasioned intense lobbying. Recycling advocates see them as crucial opportunities to craft a national standard requiring a minimum level of post-consumer content for printing and writing paper.

The big paper companies, represented by the American Forest & Paper Association, fear that adding a post-consumer requirement to the current standard would make recycled papermaking a prohibitively expensive endeavor.

"If you insist on the 50 percent and add to that a post-consumer requirement, it will continue to keep a lot of the big machines out of the game," says Martin Blick. "On the other hand, we *can* do 10 percent post-consumer. And a few big machines using 10 percent can suck up a lot more tons of post-consumer wastepaper than a lot of little mills."

Indeed, the **AFFA** claims that if just one-fourth of the large printing and writing mills used 10 percent recovered fiber, it would increase wastepaper consumption by 20 percent, or 420,000 tons.

Recycling advocates like Californians Against Waste and Ralph Nader's Government Purchasing Project have come to accept the core of the industry's argument on this point. Bringing the big printing and writing machines on-line — even at low post-consumer levels — would divert more paper from landfills and bring down the price for recycled paper. Advocates would, of course, rather see a higher minimum than the 10 percent the industry suggests — a number even Champion's Marty Blick concedes is "arbitrary."

On a second aspect of the industry proposal there is less talk of common ground. The **AFFA** suggests the following wording for the **EPA** definition of recycled paper: "50 percent total recycled fiber or 10 percent post consumer / *processed recovered fiber*" [my italics]. Why "*processed recovered fiber*"? The industry wants to expand the universe of waste that qualifies as post-consumer paper.

Consider this scenario: Like every other magazine available on newsstands, some copies of **GARBAGE** remain unsold. If these copies are utilized by a paper mill to make new paper, should they count as pre-consumer or post-consumer content? Magazine returns currently count as pre-consumer waste — after all, consumers don't discard them.

Since these magazines are deinked like post-consumer waste, the industry wants to be able to count unsold magazines, printer overruns, and other "*processed recovered fibers*" as post-consumer. They are cheaper to collect and process than paper that has actually passed through a consumer's hands.

This hedging infuriates enviros. They argue that any post-consumer synonyms would open loopholes that paper companies would use to avoid true post-consumer wastepaper.

"If you give them a way they'll duck out of using the real stuff because printer overruns are cheaper to collect and process,"

warns Eleanor Lewis, director of Ralph Nader's Government Purchasing Project. "And then they'll undersell the poor schmoe paper company who is using actual post-consumer." —E.S.

The real story in paper recycling today is a market surprise that snuck up on us. Despite a plethora of paper bins in offices nationwide, there's not enough supply.

CUTTING THROUGH THE TOWN OF CORINTH IN UPSTATE NEW YORK, the Hudson River plummets nearly 100 feet over two falls about one-half mile apart. With its ready supply of water and hydropower, early industrialists recognized that the place offers natural advantages for papermaking. No surprise, then, that a paper mill has claimed this stretch of riverbank since 1869.

Drive up Pine Street and there it is — International Paper's oldest continually operating mill. In ancient, red brick buildings, three paper machines produce 185,000 tons a year of coated publication papers used in magazines, catalogues, and textbooks. It's a modest amount compared with world class machines capable of rolling out 700 tons of paper a day. But this is hardly a backwater mill. In one vast building stands an array of screens and centrifugal cleaners which add up to a state-of-the-art deinking plant capable of removing the inks from photocopies and laser-printed paper. (Laser inks, which are fused onto paper by heat, have defied most commercial deinking operations.)

Here, amid the clatter of machinery and mind numbing heat (we visited on a July scorcher, and papermaking is a thermal process), 1,500-pound bales of office wastepaper are fed by conveyor into a pulper, where the complex process of removing printed inks from the sheets' reusable cellulose fiber begins. The end result is a line of high quality, coated printing papers containing up to 20-percent post-consumer fiber.

This is where paper recycling really takes place: not at the curbside, where we leave our bundled paper; not at the Materials Recovery Facilities, where the stuff is sorted and baled; but at places like IP's Hudson River mill and Cross Pointe's Miami, Ohio, mill and James River's Halsey, Oregon, mill, where wastepaper is remade into new paper.

Many paper companies are gambling hundreds of millions of dollars in deinking-plant investments that demand for recycled printing and writing paper is solid. And while most recycling advocates are focusing on boosting demand, recent analysis suggests the major barrier to increased use of recycled fiber in printing and writing paper can be summed up in three words: supply, supply, supply.

"We're taking in 25 tons a day of office wastepaper, and that's a modest amount," concedes Philip Leider, manager of IP's Hudson River mill. "But we're having trouble getting even that much. We've got to go as far as Boston and New York to get high quality office wastepaper."

Mr. Leider's comments are echoed by many mill managers, recycling consultants, and wastepaper brokers: The growing demand for well-sorted, high quality wastepaper may soon outstrip the available supply. Says Virginia Stefan, associate editor

"Printing and writing paper mills are going to have a real problem getting an adequate supply because consumers just aren't coming across with the damn paper."

—Richard Strauss, Sr. Consultant, Andover International Associates

of the newsletter *Paper Recycler*: "In the '80s, we collected all this wastepaper but there was no place to send it because of insufficient demand. Now demand is up, and the mills are worried about insufficient supply."

How can the industry recover more wastepaper? By boosting its deinking capacity for printing and writing paper, which comprise 28 percent (by weight) of all paper and paperboard products produced in the U.S. While tissue makers used wastepaper to supply 60 percent of their papermaking needs in 1992; and newsprint mills achieved a 36 percent wastepaper utilization rate; the printing and writing paper category managed a paltry 9 percent rate. To make a serious dent in the paper waste stream, the utilization rate for printing and writing paper must climb from 9 percent to a range that approximates other paper categories.

The good news: Deinking capacity is on the rise. As of mid-'93, 22 printing and writing mills had announced start-ups of on-site deinking plants which would be completed by 1995, according to *Paper Recycler*. Admittedly, some analysts are skeptical that all of the announcements will really be realized. (Four paper companies have slated "TBD" — To Be Determined — as their official start-up date; and most of the mills are in the small to mid-size range.) As one industry observer comments, "Talk is cheap, capital isn't."

Nevertheless, paper company executives note that government and private-sector customers are demanding recycled-content printing and writing paper, which pushes manufacturers to provide it so they can protect market share. An article in *Paper Recycler* describes the growth in deinking capacity as "phenomenal."

"It's a big investment to build a deinking plant, but we're making that investment to meet the market's requirements," says Georgia Pasquine, IP's project manager for recycled coated paper. "It should help us over the long run."

That is, if the quality of the supply holds up.

Like Unscrambling an Egg

KRUGER RECYCLING IS A WASTEPAPER-COLLECTION FIRM BASED IN Albany, New York's state capital. Although the city has a state university and scores of government office buildings awash in wastepaper, Kruger sends just two truckloads a month to IP's Hudson River mill. The problem isn't the quantity of wastepaper, but the quality.

"There just aren't enough good sorting systems in place at the local level that can meet our mills' specifications," says Georgia Pasquine. "When the bales aren't sorted properly, it raises havoc at the mill."

Paper machines are very unforgiving of contaminants that sometimes arrive in a bale of wastepaper. Even different paper types, such as file folders and wet-strength envelopes, can plug

a deinking system's cleaners.

"You'd think the Office of General Services could see to it that [Albany's] state offices were source-separating wastepaper, but they're not," says Richard Loyst, president of Kruger Recycling. "They bring the paper to us completely commingled, and it's like trying to unscramble an egg."

Mr. Loyst says that office-wastepaper collection is in an "embryonic" stage, and recent data bear him out. Analysis by Andover International Associates projects that high-quality office-wastepaper (owp) recovery must increase to 31 percent in 1995 from 4 percent in 1992 to meet increasing consumption by the paper industry. The Danvers, Massachusetts-based research firm contends that unless a nationwide campaign is undertaken to initiate programs to source separate and collect office wastepaper, supply will fall short of demand.

"By 1995, the supply of owp will be inadequate to meet printing and writing paper production capacity," says Richard Strauss, AIA's senior consultant. "You can't pull high quality wastepaper from municipal collection services. The only potential sources are pre-consumer [paper scrap generated by printers and other businesses], which is largely tapped out; and wastepaper from office buildings, which is the weak link in the system."

"There's very little financial incentive for office-building management to collect wastepaper. In fact, it's a money loser," he continues. "The mills are going to have a problem getting an adequate supply because consumers just aren't coming across with the damn paper."

Look around your own office. Chances are, a jumble of different paper types — fax, colored ledger, file folders, index cards, stationery — are dumped into a single box. You're leaving it to others to sort the stuff, and it's unlikely that any of it will be recycled back into printing and writing paper. (Most likely, it will be remade into lower grades such as corrugated container and paperboard.)

Industry analysts suggest that targeting large office buildings, with their big volumes of wastepaper, will make office-wastepaper collection more cost effective. Also, mills must form partnerships with key suppliers such as haulers and recycling firms which will do the sorting according to their specifications.

"There's a ready supply of office wastepaper and there's a good demand for it," says Mr. Loyst. "It's up to us to figure ways to economically sort it."

—B.B.

As the scientific debate over chlorine bleaching continues, the paper industry moves to cover all of the bases.

CONSUMERS LIKE THEIR PAPER BRIGHT AND WHITE, SO KRAFT (VIRGIN) pulp must be bleached. The most powerful bleaching agent is

chlorine gas. During bleaching, chlorine breaks down and combines with other elements to form "organochlorines," a family of chemicals which in kraft pulp mills take the form of liquid waste that is treated, then discharged into the nearest waterway. The outflow includes substances such as furans and dioxins, which do not break down quickly in the environment. Instead, they "bioaccumulate" in the fatty tissue of aquatic species as they work their way up the food chain.

For more than a decade, the presence of dioxins in kraft pulping discharges has sparked heated debate. Recent research indicates that exposure to high levels of the dioxin 2,3,7,8-TCDD significantly increases cancer death rates in humans, although the effects of low levels is a matter of debate. Industry researchers believe the dangers are overblown by hysterical media coverage. They argue that at the minute concentrations discharged by kraft mills, dioxins pose little risk to human health or wildlife. Some independent researchers agree.

Stung by the criticism, in 1990 the EPA began a comprehensive reassessment of dioxin which could lead to revisions in regulations. Its findings are not yet final, but the agency's chief toxicologist, Linda Birnbaum, predicts the research will conclude that exposure to even minute amounts of dioxins (measured in parts per quadrillion) poses health risks. That conclusion would be disputed, but some papermakers have concluded that the "dioxin threat" is so well entrenched in the consumer's mind that the public-image battle already has been lost.

Greenpeace did, after all, spend much of the 1980s waging a public-relations campaign in northern Europe over chlorine bleaching, focusing on the presence of dioxins in both mill discharges and certain paper products. By the end of the decade, consumer demand for "chlorine-free" products in Germany and Scandinavia had governments announcing phased bans of chlorine, and papermakers scrambling for substitutes.

In the U.S., several firms are investing many millions of dollars in new mills which they call "Essentially Chlorine Free," or "ecf." In these pulp mills, ozone, oxygen, or hydrogen peroxide replaces pure (elemental) chlorine, while a chlorine compound (such as chlorine dioxide) is added to "finish" the pulp to a brightness and strength which closely approximate pure-chlorine bleaching standards. The process cuts dioxin discharges to nearly undetectable concentrations; and it sharply reduces total organochlorine discharges.

One of the larger ecf facilities is Union Camp's Franklin, Virginia, pulp mill. Its director, Wells Nutt, notes proudly that the mill discharges 2,000 gallons of partially treated liquid waste per ton of pulp produced, versus 13,000 gallons

for a conventional chlorine bleaching mill, and "virtually no" dioxins or furans.

Greenpeace and other activist groups think paper mills can do better. Some governments agree. British Columbia and Ontario, which have large concentrations of pulp and paper mills, recently announced bans on all organochlorine discharges. (The bans will be phased in over the next decade.)

Most papermakers insist there is no proven environmental benefit to completely eliminating chlorine. The Ontario Forest Industries Association spoke for many when it blasted Ontario's proposed ban as "based neither on scientific evidence nor environmental need."

Nevertheless, regulatory pressure and consumer demand are spurring some firms to pursue new "Totally Chlorine Free," or tcf technologies. Montreal-based Repap Enterprises, one of Canada's leading paper producers, has refined a process that uses alcohol as the bleaching agent.

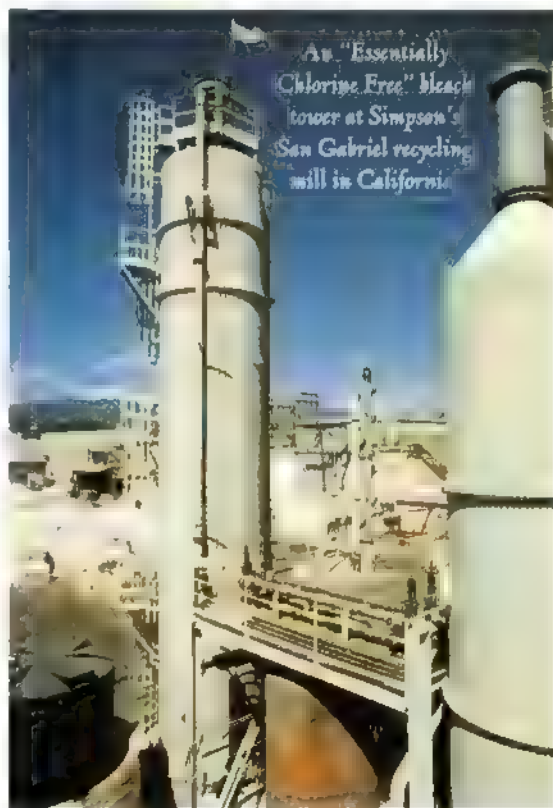
Other companies are testing, patenting, and beginning to market tcf systems, including Union Camp (theirs uses hydrogen peroxide). A few firms, such as Lyons Falls Paper in upstate New York, are producing paper in the U.S. and Canada using tcf pulp. Some report that tcf affords cost savings, thanks to eliminating the purchase price for chlorine and to reducing maintenance costs by using less corrosive bleaching agents.

For now, it doesn't look like the EPA will include a ban on chlorine in its new pulp and paper discharge regulations (due in October). Mark Luttner, director of policy and management of EPA's water division, notes that the Clean Water Act requires the agency to base its discharge regulations on what seems to be the "best available technology [that's] economically achievable." The

agency is leaning towards the various "ecf" processes as fitting that description.

The new Clean Water Act proposed in the Senate does not include a ban on chlorine use. Some provisions of the bill, though, would put more pressure on the paper industry; including one that would require it to eliminate bioaccumulative toxicants from waste streams. That could include dioxins and furans, depending in part on the results of the dioxin reassessment. —P.B.

Formerly the Editor of the GREAT LAKES REPORTER, a regional journal of environmental news and analysis, Paul Botts has reported extensively on the pulp and paper industry. He lives in Chicago. □





Rewelt!

Among the 3R's, Reuse is an Overlooked stepchild Compared to its celebrity kin, Recycle. Reduce and Reuse.

Introducing 5 Innovators who have pioneered Creative, even profit able ways to Reuse our well used Possessions.
by Hannah Holmes

REDUCE, REUSE, AND RECYCLE ARE STILL THE BASIC THREE RS

of minimizing our environmental impact. Recycling we all seem to grasp, thanks to city by-city recycling laws and the hard work of grassroots groups. Reducing consumption is the goal of oodles of legislation, packaging redesign, and even energy-tax fans. What about Reuse?

What exactly are the Powers That Be doing to make sure we get more than one bang for our buck? Who's overseeing

the resurrection of dead computers? What agency will instruct me in the salvation of sweaters with blown-out elbows? Nothing; none. No, reuse is a vast, ungoverned wilderness where rugged individuals rule with vigilante vigor. ☺ We've scoured the nation to bring you the royalty of renovation, the aristocracy intoning "Oh, don't throw that out." These are people who spotted a problem and took the challenge personally. Their lifestyles are unusual as a result they live in houses decorated, furnished, or even built

ILLUSTRATION BY Nicholas Vitacco

with things other people already used. They and their children dress in clothes that were softened by a previous owner. While the resulting aesthetic is sharply different from that in households which salute the current rules of fashion, the results are not shabby. Reuse royalty are born with a yard-sale silver spoon in their mouth, and with an uncanny ability to see the potential in an old...you-name it.

LETTERING BY Kathy Boone W.



Heidi Gerquest

DENTED DECOR GOES CHIC

Maine

SHE PICKING PART OF IT — GOING JUNKING — THAT part takes a lot of patience," grins Heidi Gerquest, 32, interior decorator and creator of whimsical furniture. "I hated it when I was a kid. Every time we went on vacation, my mother had to stop at every damn yard sale on the road."

Now Heidi does her own junking, gathering old doors, shutters, windows, porch railings, gingerbread trim, signs, and strange wooden gizmos to stock the barn behind her house. She haunts yard sales, barn sales, even people's curbside garbage piles. And there are special finds, too — she and some friends once discovered a cache of wooden models for casting wheels for locomotives, which Heidi used to fashion furniture. (A concerned

educator who saw the group dividing up the strange shapes in a Connecticut school parking lot called the cops.)

Considering herself first a painter, Heidi calls her peeling and chipped, dinged and dented discoveries her canvases. But before she paints, she sculpts: Porch balustrades become table legs or bed headboard ends. Shutters are transformed into tall, narrow cupboards. A tall, oval decorative piece from a door frame is glassed in, then flanked with sections of porch railing to make a room divider. The "O" from a big sign frames a doll portrait that forms the back of a chair. The walls of her workshop are lined with turn-of-the-century wooden curiosities that add a gorgeous whimsy to the furniture. Old croquet balls appear on top of cabinets and underneath room screens.

And then she paints. Looking at Heidi's furniture makes you thirsty. Oak leaves cloak the sides of a narrow cupboard. Gold pears cascade down the inside of the door. A light bulb glows through an old shade painted with leaves. Sun drifts through a room divider,

leaving a pattern of swirling circles on the floor. A pastel headboard flaunts a whirl of fruit and flowers. When Heidi decorates a whole room, she may even paint the walls with flowers or fruit. She also tries to convince people to let her re-make any old items they may be tired of.

"These materials have an aesthetic of their own," she says. "They have a sense of history. I'm very fond of rough and chipped things. I like to leave the old paint on."

But, these days, Heidi is having a harder time finding old doors. Even the weird pieces of trim she depends on are becoming popular home decorations. On the bright side, this new public appreciation for old stuff, combined with her inimitable palette of colors, is resulting in all the jobs Heidi can handle. She's decorated a handful of houses in Maine, and a smattering of apartments and mansions across the country.

Yes, mansions! One-of-a-kind, hand-painted walls and furniture aren't within everyone's reach. Since she began in 1986, she's worked mostly on a commission basis, by word of mouth. But increasingly, her pieces are sold through galleries, doubling

the price. A pair of O-backed "Ancestral Chairs," sporting bur-nished croquet-ball feet and hand-grips, are listed at \$2,200 in a Portland gallery.

Richard Spencer

HIGH-TECH TINKERING

Cloverdale, California

REW YEARS AGO, RICHARD SPENCER WAS DOING SOME BUILD-ing work for a small California winery near his Clo-verdale hometown. A born tinkerer, he gravitated toward the bottling line — all that lovely machinery. And after watching three people spend their days taking empty bottles from a box and stand them on the filling line, he was given his first major tinkering commission.

"I had seen an automatic bottle unpacker in an equipment catalog," he says. He convinced the company to sell him just the rubber cups, which usually come attached to \$250,000 worth of fancy machinery. In an old aluminum road sign, Richard drilled 24 holes to match the position of bottles in a carton. He mounted the suction cups in the sign, hooked them up to an old vacuum machine, and suspended it over the bottle line. Now one person guides the contraption over a carton of bottles and pushes the vacuum button to lift all the bottles at once.

"It probably paid for itself in two or three hours," he laughs. "I thought, 'Well, geez — you could do that with a lot of things.'" And he did. When he started, the bottling line required 18 to 20 people, doing boring, repetitive tasks. Richard's enlightened fiddling reduced it to seven.

Richard, 42, remembers *Mechanics Illustrated* as the book that got him hooked as a boy. In the back was a section on mak-ing military surplus equipment into farm machinery. "All through school, problem solving was the only thing that interested me," he says. Although construction has paid many of life's bills, tin-king is now taking over full time.

Beside Richard's house (which he built for \$5,000) is an

old shed housing his tools and stashes of computer parts, rem-nants of an Eastern Airlines baggage carrier, hardware, a 100-year-old lathe, and sundry scavengings.

Computers — a plentiful commodity in California — provide lots of inspiration. The vacuum system from IBM hard drives can be rewired for jewelers, to suck liquid metal into a mold. The jeweler pays \$100, rather than \$1,500 for an off-the-shelf vacuum. The heavy magnets in computers may be mount-ed on the back of a forklift to collect stray nails at a construction site, or on the end of a fishing line to retrieve lost lures.

Richard can work with anything: He can cast old tooth fillings into new rings. The little disk of glass in the base of a light bulb makes a great dish for the beautiful doll houses he makes of found objects. With plumbing parts, a rubber band, and two salad bowls he fashions a low-cost, static-electricity generator for school science classes.

He finds many raw materials at the local recycling center, but he's not picky. He confesses to the driving style of a true scavenger, who'll lock up the brakes to retrieve a roadside bolt, then he laughs.

"But I'm even worse than that. If I see a pile of stuff in some-one's yard, I'll stop and say, 'Gee, do you need that stuff taken to the dump? Got any more in the barn?'"

Richard Spencer, 26852 Mountain Pine Rd.,
Cloverdale, CA 95425

Cornelia Kietzman

DOUBLE DUTY FOR DUDS

Corinth, Vermont

LOATH TO CLOTHE HER BABY IN EITHER FLIMSY SYNTHETICS OR flimsy, freshly chemified cotton, Cornelia Kietzman hit on one of those common-sense solutions that in hindsight seems obvious. She took one of her old cashmere sweaters, snipped the sleeves off, then cut what amounted to a gingerbread man, front and back, out of the body. She stitched up the arms and legs, and added a zipper in the crotch. The result was a children's garment made of adult-weight cloth.

Second-hand clothes were no novelty to the baby, who was already accustomed to his cousins' hand-me-downs. The novelty, says Cornelia, was that her child could dress warmly without struggling into four layers of clothing. The one-piece construction kept his belly from being exposed. And the heavy fabric kept warm air in.

All of this was important because Cornelia and her fam-ily were living in a frosty old farmhouse in Corinth, Vermont. It didn't take long for friends to recognize the benefits of re-made baby clothes, and RE baby was born. Sweatshirt sleeves became thick baby pants. Velour shirts became soft jumpsuits. Scraps of every sort of fabric became fun, head-warming hats.

Cornelia, 32, shops at thrift stores and flea markets, gets



donations from friends, and even from manufacturers. An upholsterer gives her decorative scraps that she works into clothing, and a leotard manufacturer passes along trim for waistbands. Curtains, tablecloths, and handkerchiefs also find their way into RE baby duds. Having found the market for children's woolens slow, she now sticks to 100 percent cotton materials. Even so, acceptance comes slowly.

"It seems like the majority of people don't want to put their babies in anything someone else has worn," she says. "I've had to really woo the public to get them to notice that the clothes are cute, and that it's fine if someone else wore them."

In fact, there are advantages to someone else donning the duds first. The heavy fabrics are softened by wearing. Someone else has washed all the sizing and other chemicals out of the cloth. Of course, it's also an efficient use of cotton, which is none too clean in its farming and processing.

"Originally, my concern was for my own son," says Cornelia, who recently tried big-city life in Philadelphia, but is now back in Vermont. "But since then, it's come to really matter to me that we use resources well." Her son will continue to benefit from adult fabrics for a year or so. At about four, he'll outgrow adult pieces.

A handful of Vermont and Philadelphia stores carry RE baby clothes, which are stitched on a professional machine and sport a new tag. And Cornelia, a full-time mother, is confident that when she can spend more time sewing and marketing, RE baby will mature quickly. "I've always recycled because it's the

right thing to do," she muses. "The idea that I could support myself by recycling is pretty strange. In a good way!"

RE baby, RD#1, Box 108, Corinth, VT 05039

Jim Broadstreet

MAKING CASTLES FROM CAST-OFFS

Springfield, Missouri

RIGHT NOW, I KNOW WHERE THERE'S A BUNCH OF SPANISH roofing tile. I know where there's a lot of glass, from patio doors. I usually know where there's an old school being taken down — those slate blackboards make wonderful floors. And I know where there's a stockpile of steel panels cut out of the top of Ford vans to make ambulances. I'm gonna use them someday."

For a guy who's 63 and cutting back to simply designing houses, Jim Broadstreet has a lot of stuff to use up. He continues reciting his inventory, which includes a cellar full of junk, as well as some backyard stashes at his Springfield home: "I got hold of a whole bunch of tile sewer pipes piled out back there, and they look kinda pretty — from one direction, they look like sculpture."

Jim began his career as a child of the Depression and a strong mother. "I was raised by a single mother who had to get by on very few things. My education in architecture built on that." Jim's tree-houses were products solely of his ingenuity, and the trait grew with him. He is now known as the man to see if you want a ... well, a certain kind of house.

Jim's houses speak to a different aesthetic than that which dictates the average house shape. "I don't like the standard, ordinary ticky-tack." His abodes are guaranteed to look like no other, and to cost a good deal less. His clients tend to be do-it-yourselfers.

For proof, take a tour of his current project, a house that will jut out over a water-filled marble quarry. Happily, there are rejected blocks of marble at the site, some weighing 36,000 pounds. Foundation blocks, in Jim's eyes. There are three giant steel beams that will cantilever over the quarry, weighted with more marble blocks. The floors will be





classic blackboard. The owners have caught the scavenging bug, and have produced piles of reclaimed wood, plus scraps of good marble for the bathrooms. When they come to Jim, excited about some material a friend or relative has discovered, sometimes it can be incorporated, sometimes not.

"It works well to have a collection of

materials and design around them. It does not work well to design a structure, then go out and try to find the materials," says Jim.

Although Jim's recent book is entitled *Building with Junk*, he has no interest in houses that look like they were built with junk. He says he sometimes disagrees with clients over showing off a particularly nice piece of wood or glass. "I don't like to get cute with materials. I want it to be sophisticated or I don't want to do it."

Jim Broadstreet, 713 S. Oak Grove, Springfield, MO 65802
BUILDING WITH JUNK can be had for \$22.95 ppd., from Loompanics Unlimited, P.O. Box 1197, Port Townsend, WA 98368.

Ron Krupp

WHITE GOODS REINCARNATED

Burlington, Vermont

ROUGH RON KRUPP DABBLED IN MANY SOCIAL ISSUES, when he hurt his back recently it was time for something new. Steaming with a buddy in the YMCA sauna, he hit on his new path: He would play savior to worn-out household goods, simultaneously providing training to homeless people, prisoners, and at-risk youth. "It was a creative idea," he says, "but it wasn't new for me. I always think in those terms."

ReCycle North opened in 1991. To the visitor, it appears as a large warehouse sheltering what Ron, 50, now calls "Vermont's biggest yard sale: indoor, perpetual, and perennial." There are mended tables, china, easy chairs, tuned-up TVs, refurbished freezers, bicycles, air conditioners, even antiques and children's toys — you know, a yard sale.

ReCycle North starts with donations. People haul their junk to the warehouse instead of to the dump or a consignment

Since this story was completed, Ron Krupp has left ReCycle North, where he was the director. He is researching the possibility of starting a barter network.

store. Ron won't accept any old thing — donations must show some potential, even if that's just a few serviceable parts on an old freezer.

The donations go to the back of the warehouse, where both trash and people are transformed. Six staff members, bolstered by a corps of volunteers, oversee a wood shop and appliance shop, as well as the collection and delivery of goods and management of the store. Incoming work-release prisoners, homeless people, and other trainees are assigned apprenticeships to one area or another. A recent arrival, for example, was needed for appliance pick-up and shop maintenance. He, however, wanted to learn woodworking. They have negotiated a schedule that lets him apprentice in both jobs.

Once assigned, trainees start small — with, say, simple appliances like dryers and electric stoves. They work on the salvageable goods, and scrap hopeless items for recycling. After six months (the average stay), a trainee has learned to find the life in broken furniture, mastered the reincarnation of air conditioners and freezers, or simply gained solid job experience by filling in the gaps that keep ReCycle North running smoothly.

Of the refurbished appliances, some \$20,000 worth are donated to low-income families every year as part of ReCycle



North's mission to "give back" to the community. The rest go into the store at bargain prices.

"Appliances rarely come back," says Ron proudly. Which is more than he can say for the trainees, some of whom have returned to the same sad patterns that first drove them to the street. He's philosophical about it. ReCycle North does not attempt to provide counseling to its trainees — just good skills and experience, along with a sense that every squeaky chair, every collapsed bookshelf, each silent refrigerator, and every hard-worn soul deserves a second chance.

ReCycle North, PO Box 158, Burlington, VT 05401 ■

THE FINE ART OF

RALPH WALDO EMERSON IS CREDITED WITH DECLARING THAT A WEED "IS A PLANT WHOSE VIRTUES HAVE NOT YET been discovered." For Emerson, the ultimate organic solution to weed pollution is the "spiritual path": embracing all of God's flora and refraining from crass judgments that denigrate **certain plants** as unworthy. ➤ I think not! If you don't want it growing in your yard, it's a weed. Simple as that.

s t o r y b y ROBERT KOURIK So what's the safest and sanest way to weed a weed? You can opt for the Apocalypse Now approach, employing a battery of chemical herbicides to bomb every chlorophyll-

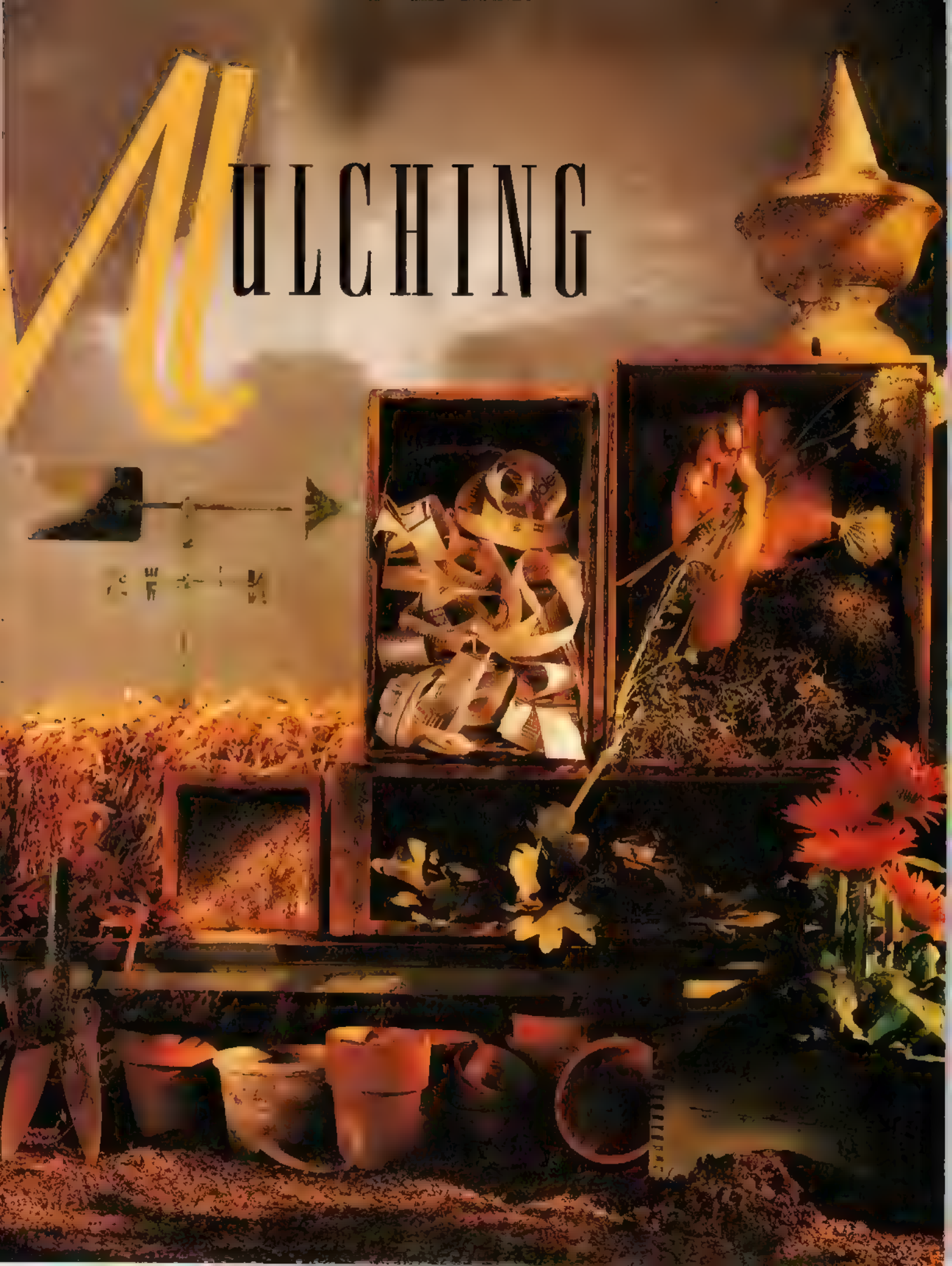
bearing creature in your yard. It'll certainly spare your back (from weeding) and save you some leisure time. Of course, the local fauna might not appreciate such a dosing; and then there's the nettlesome problem of getting rid of the empty spray containers. (Call it household hazardous waste disposal.) ➤ For the nonapocalyptic approach to weeding, gardeners can choose from an array of nontoxic, **uncomplicated**, and environmentally sound strategies. Dear reader, I give you ... mulch. Mulch is any organic matter that's spread around plants to improve soil and prevent weeds. Mulch comes in all varieties and prices: free chipped yard trimmings from a tree

Ten tips for chemical-free weed control

service; washed cow manure (called "solids") for \$20 to \$30 a truck load; ornamental gravel of various colors for \$18 to \$30 a ton; finished compost for \$8 to \$20 a cubic yard. ➤ Mulch is not, however, a gardening panacea. A poorly chosen mulch can cause some problems in the **garden**: insect pests secrete and multiply in a mulch's nooks and crannies; mulch can foster root rot when it rains too much; it keeps soil cold in the early spring, sometimes delaying plant growth. That said, mulching recycles yard debris and it's a natural approach to weed control. Natural weed management doesn't eliminate all weeds for years to come. It means choosing which "battles" to fight, how many "prisoners" to take, and which of the "enemy" to leave alone.

p h o t o g r a p h b y
SUSIE CUSHNER

MULCHING



WEEDS & TREES

LAYERING MULCH Let's begin with the largest landscape elements: ornamental and fruit trees. The best way to conserve moisture and nutrients and retard weed growth is to ① lay a carpet of mulch beneath your trees. The feeding roots of most trees begin just inside the dripline (the shadow cast at noon by the tree's foliage) and extend to well beyond the branches. So lay the mulch in a doughnut shape (the tree's trunk occupies the "hole") beginning just inside the dripline and extending to well beyond the widest limbs. This takes a lot of mulch — one cubic yard covers 100-square feet about four-inches deep. Prices vary considerably around the country, but mulch costs roughly \$8

to \$26 a cubic yard.

MAKING MULCH To save on purchasing the stuff, why not make it yourself? ② After you've trimmed a hedge or pruned some fruit-tree limbs, shredding them in a chipper produces an attractive "wood chip" mulch resembling the litter of a natural forest floor. Consider buying a chipper only if you do lots of pruning every year. (See "Tips for Buying a Mulcher," p. 49.) Otherwise, rent one or hire a tree service to do the chipping for you.

When chipping, avoid any material that might resprout from small pieces in the mulch — such as willows, acacias, alders, and various vines, like honeysuckle. Also, watch out for allelopathic plants — those plants whose foliage makes a chemical or kills other plants trying to grow nearby. Examples

LEAD HAS BEEN GETTING INCREASING ATTENTION because of its potential to depress intelligence and learning ability in children — although lead poisoning can produce a variety of symptoms in both children and adults. There are many sources of lead exposure, including paint, dust, and tap water which flows through lead pipes. Newsprint is not one of them. Unfortunately, the myth that newspapers contain lead based inks still lingers.

Virtually all newspapers voluntarily eliminated lead from newsprint over 15 years ago. Ruth Felland, production materials manager at the Newspaper Association of America, reports that random testing of newsprint samples have never found

lead levels above the Association's strict safety limit. Paul Volpe, technical coordinator for the National Association of Printing Ink Manufacturers, adds that "even the colored inks sanctioned by the Newspaper Association of America for

AN UNLEADED GARDEN

use in the Sunday comics have excluded lead based pigments for over 15 years." (The slick, glossy sections and ad supplements are a different story — they may possibly contain inks with heavy-metal based pigments.)

The industry's conversion to lead free inks was not a spontaneous environmental gesture. Ms. Felland characterizes the switch to unleaded organic inks as a "pro-active move" which would set a standard before government regulations were developed. The guidelines for newspaper ink constituents are voluntary and enforced solely by the ink and newspaper publishers industries, without the heavy legal arm of the federal government. The vast majority of ink manufacturers comply with the NAA's standard. The rare exceptions are usually small, independently owned papers who buy their colored ink from local ink makers.

The bottom-line concern for gardeners using newspaper mulch is this: Can harmful amounts of lead migrate through the soil, into the plant's roots, and up into the edible portion of the plant?

According to Dr. Scott Angle, professor of agronomy at the University of Maryland, lead's mobility is so restricted that concern about lead-levels in newsprint is unfounded. When lead gets mixed into the soil it bonds with available phosphorous to make lead phosphate, a chemical form of lead that roots can't absorb. For lead to migrate through soil and into the plant, the soil's pH level must be below 5.5, which is quite acidic and tolerated only by potatoes, cranberries, and blueberries. The soil's supply of phosphorous must also be low. Says Dr. Angle, "If all the conditions existed for lead uptake, the plant would probably be dead."

If you're still concerned about newspaper mulch, call your local newspaper and ask them if they've switched to lead-free ink.



of allelopathic plants include black walnut (*Juglans nigra*); sagebrush (*Artemisia californica*); and mesquite (*Prosopis glandulosa torreyana*), which is allelopathic to tomato plants. Also, some hardwood chips, such as oak chips; and softwood chips from conifer, pine, and Douglas fir (*Pseudotsuga menziesii*) tend to be slightly acidic and are best reserved for shade-tolerant, acid-loving plants or for pathways.

Even after exposure to rain and snow, mulches such as hay, crudely chipped brush, and leaves never "settle down" onto the soil. These "loose mulches" aren't compact enough to suppress all weed seedlings unless the material is heaped high enough (six to twelve inches) to prevent germination. A dense, compact mulch enables you to cover the same area with far less material because the mulch's weight suppresses sprouting seedlings. A denser mulch such as turkey bedding, wood chips, and gravel may need to be just four to six inches deep. One caveat: Certain stubborn perennial weeds, like dandelions, dock, and burdock, can sprout through 12 to 18 inches of loose and dense mulch. For unmanageable plants like these (as well as vile plants like poison oak, poison ivy, and blackberry), I use a layered mulch comprised of used carpet and wood chips.

CARPET MULCHING The first step in "carpet mulching" is to ③ scavenge from the dumpsters behind carpet stores. (My pickup truck comes in handy.) Next, I prepare an area beneath and beyond my fruit trees by simply weed-whacking all the poison oak and berry vines down to a supine position. Then I lay the carpet pieces over the area, with the beige-backing facing up — and a foot or two of overlap at all edges. Finally, I cover the carpet with a relatively thin layer of wood chips to disguise the wayward rug. (This allows me to spread a limited supply of chips over a much larger area.)

Once upon a time, I pulled up the corner of a mulched rug around an apple tree to find the long-suffering branches of a blackberry vine still trying to escape — after five years of burial! One sturdy carpet will bury berry vines, poison ivy, and poison oak for five to ten years. A word of caution: Mulched carpet is extremely difficult to remove, so carpet mulch only when you're certain you won't alter your landscape design.

DEWEEDING YOUR GARDEN

SPACING YOUR PLANTINGS Before planting shrubs or ground covers, ④ consider reducing or eliminating your later weeding efforts by spending a little more money and time upfront. My first weed management strategy is to plan for slightly more plants than most gardening books would recommend. If a book suggests that English lavender, for example, be spaced three feet apart (because that's how wide a mature plant gets), I space the plantings every 24 inches or closer. Nature doesn't dictate that plants be equidistant based on their mature width. Besides, many shrubs take a number of years to mature; meanwhile, you've got to weed those areas of sunny, exposed soil. I plant so the foliage will fill in within the first season, figuring that the cost of a few more plants is made up in the reduced weeding.

I also plant very few classic, prostrate ground covers. Low-

growing plants such as ivy, ornamental strawberry, and violets often remain weedy because they allow plenty of sunlight through their leaves to germinate windblown seed. I want plants that are taller than 12 inches and have a dense, shady foliage to block seed-germinating sunshine. Stem-rooting thymes are an exception at my house: they form a dense mat that seems to be fairly weed free, as long as they're distanced from annual grasses.

NEWSPAPER MULCH No matter how densely I plant, the plants need mulching for weed and moisture control for at least the first season. This is ⑤ where I use newspaper and mulch as an attractive, biodegradable herbicide. (If you're worried about lead in newsprint, don't be. Practically speaking, newspapers are virtually lead-free. See "An Unleaded Garden," p. 46.)

After planting, place five to ten sheets of newspaper over the exposed soil and up to the base of each plant. (To keep the wind from unraveling your work, soak thick sections of the paper in water for three to five minutes before spreading them in the garden.) The newspaper acts as a temporary barrier, stifling all seeds that germinate and some sprouting roots, such as dandelion and chicory. In a season or two, the paper will have degraded into organic matter. If you don't stir or till the soil, all remaining viable seeds will be so deep beneath the surface that they can't sprout. After a year or two, your plants' canopy will fully shade the soil and limit the amount of germinating seed.

Next, cover the newspaper with an attractive mulch. (Avoid homemade compost, as it's rarely free of weed seed just waiting for the right conditions to sprout.) I use a wood-chip bedding (it looks more like sawdust) from local turkey farms. While it's low in nitrogen, the turkey's indoor habitat and pellet-based feed ensures the absence of weed seed. Other options for seed-free mulch include sand, washed gravel, wood chips, chipped bark, sawdust, salt hay (if not over-harvested), or shredded leaves.

Vegetables grown from transplants, bulbs, or tubers are well suited to a seasonal newspaper mulch. For example, garlic is fall-planted in California and grows throughout the winter, when grasses and weeds also flourish. (Garlic won't form large heads with big cloves in a weedy garden.) Since I like to use newspaper mulch whenever possible, I convinced my friend Chester to plant his collection of 35 types of garlic with a mulch of newspaper covered with turkey bedding.

The soil in each raised, wooden bed is fertilized, tilled, and raked smooth. Wet newspaper is spread over the entire



We planted 35 varieties of garlic with a mulch of newspaper (above) covered with turkey bedding.



bed. (Rows are marked with green garden tape to differentiate the varieties of garlic.) Then a sharp knife is used to poke a wide hole where each clove is to be planted. After the cloves are inserted into the soil, several inches of mulch are applied to the newspaper. Before garlic is harvested, all water is withheld so the mature garlic heads can begin their curing process in the soil. In the first season, we learned that with newspaper mulch, the water can be withheld up to four weeks earlier than we'd guessed. (Of course, this varies considerably according to region and climate.)

Other crops that are planted far apart are candidates for newspaper mulch, but with certain reservations. Broccoli seedlings, for example, are usually transplanted 12 to 24 inches apart. In coastal California, broccoli is often fall-planted. The wet winters provide effortless irrigation but also stimulate teeming populations of snails and slugs, which thrive in mulch. In the end, bare soil (and the more laborious hand weeding or hoeing) for fall-planted vegetables may be the wisest choice. Similar crops planted late enough in the spring may escape damage from hibernating garden mollusks, even when mulched.

In the past few years, there's been a wave of interest in a New Age sounding technique called "soil solarization." It's supposed to be a non-chemical way to kill all weed seeds and pathogens in the upper soil. The process involves blanketing the tilled, bare soil with clear, polyethylene sheeting during the summer and literally baking the covered earth. Unfortunately, the heat generated doesn't penetrate very deeply — less than an inch or two. Any hoeing, planting, or tilling done after your soil is solarized will bring viable, dormant seed to the surface to ger-

In my garden in Occidental, Calif., I use a mulch of old carpet covered with wood chips to keep a lid on poison oak and blackberry.

minate. Soil solarization is best used as a superficial remedy for disease or pathogens, followed by planting perennials and blanketing with newspaper and mulch.

WEEDY TURF WARS

WEEDING LAWNS WITHOUT EMPLOYING AN ARSENAL OF CHEMICALS may be an organic gardener's toughest challenge because most lawns are so large. The ideal solution begins with properly establishing your lawn and continues with proper seasonal care. The goal is to avoid tedious hand-weeding.

MOWING IT RIGHT A thick turf is the first defense against weeds getting a "root-hold" on the lawn. Homeowners with plenty of cash can opt for virtually weed-free sod grown at a chemically intensive sod farm. Less prosperous homeowners can get good results with seed-grown lawns. **6** First, select the best grass for your climate — one that isn't dependent on a lot of water and fertilizer. Consult *The Chemical-Free Lawn* by Warren Schultz (Rodale Press, 1989) for excellent advice on all aspects of organic lawn care, especially on selecting a grass variety. Hedge your bets with proper soil preparation and ample fertilizing, and by sowing extra lawn seed.

The next most important tactic to maintaining a healthy, unweedy organic lawn is mowing at the proper height. The blades of grass help shade out sprouting weed seeds. So with a new lawn, the higher the lawn mower setting (up to three inch-

es) the better the coverage. In a study at Purdue University, a mower set at a height of just $3/4$ inches reduced by almost 50% the coverage of bluegrass seed after 22 weeks, compared with three inch-high mowings.

Mower height is even more important than frequency of mowing. As the lawn matures, the mowing height will depend on the season and the type of turf, ranging from $1/2$ to $2\frac{1}{2}$ inches. With each mowing, ideally no more than $4/10$ ths of the grass blade is trimmed.

POWER MULCHING If you use a gas-powered mower, consider switching to **7** a mulching mower. It has a specially designed

blade and blade housing that finely chops the lawn clippings and blows them back into the turf, where they can decompose and help fertilize the lawn. (Some manufacturers sell conversion kits for regular lawn mowers.) Recent studies show that mowing when the grass is 1 to $1\frac{1}{2}$ -inches taller than the cutting height may provide all the fertility needed for continued good growth. Mulching mowers also save time, since you needn't bother with bagging the clippings.

Above all, remember this: No matter how you mow it, blow it, whack it, or stack it, mulch is an effective, chemical-free way to corral your weeds.

8 CHIPPERS ARE POWERED BY EITHER ELECTRIC OR GASOLINE engines. With the best chippers, branches are thrust down a side chute, into a rotating disk with fixed blades that shear the wood into chips — like carrots being cut in a food processor. The gasoline engines are the fastest, some six times faster than the best electric shredder. (However, electrically powered models are quieter and reduce vibration of the branches being chipped.)

Regardless of the type of gasoline-powered shredder you get, choose a name-brand engine with the highest affordable horsepower for taking on large branches. Make sure the rest of the machine is built with thick-gauge metal. Choose a model that looks and feels sturdy and well constructed: one with nuts and bolts with lock washers, not screws. With a gasoline-powered model, check to be sure it's easy to change the oil.

Warning: The manufacturer's advertising will often say something like "Takes branches up to $1\frac{1}{4}$ -inches thick!" Notice that most ads don't use the word "hardwood." Every type of wood is different; take samples of the types and diameters of wood you'll be chipping to a garden supply dealer for a test run. Also note that studies show that some chippers can handle the largest-diameter limbs mentioned in their literature only if these limbs are straight. A good chipper runs from \$500 to \$1,400.

9 LEAF SHREDDERS COME IN SEVERAL BASIC TYPES: LEAF BLOWERS, which can be reversed to suck and shred the leaves; and gasoline or electrically powered leaf shredders, called dedicated leaf shredders, with either a filament or metal blade.

Gas-powered shredders often require frequent cleaning of the air filter; while electric shredders use a heavy-duty extension cord that can be cumbersome. Electric shredders are often slower than gas-powered models; yet some of the electrically powered brands slice and dice leaves as fast as the gas

versions. The time required to shred 30 gallons of dry leaves can range from 30 to 40 seconds to four minutes. Be sure to ask the dealer whether the machine can handle wet leaves.

First rule when purchasing a shredder: Always ask for a demonstration. Check out the "ratio of reduction": the greater the ratio, the smaller the wood chip. Other features to consider: Make sure it's easy to bag the shredded leaves; check the intake and discharge ports to see that they protect your hands and eyes from flying debris; choose a model with a large hopper for loading bulky materials like brush, straw, and leaves. If a tamper for pushing leaves into the hopper isn't included, make one. When shredding, always wear protective goggles — some models include a pair. For a good leaf shredder, expect to pay \$100 to \$275.

10 THE MOST IMPORTANT CRITERIA FOR SELECTING A MULCHING mower is the engine's horsepower rating. The mowers need at least a four- or five-h.p. engine to move the blade quickly

TIPS FOR BUYING A MULCHER

enough to achieve cutting, shredding, and mulching. When you visit the dealer, don't be shy: take different models for a test mow. Watch for clogging and a ragged cut. (The best cut is often made by mowers with a doughnut-shaped blade housing.) And compare decibel levels — some models make more of a racket than others.

Other tips to consider: Check the handle for comfort and ease of adjustment — it should be covered to reduce vibration; it should also be easy to change the oil and remove the blade for sharpening. Sturdy metal wheels with ball bearings last the longest and make mowing easier.

A good quality, walk-behind mulching mower ranges from \$200 to \$500. (For a big spread, there are riding versions costing much more money.)



Save the Desert! (Why?)

THE COSTLY RESTORATION OF ABUSED ECOSYSTEMS IS A hard sell, even when the return includes beautiful flowers and cute animals. When the displaced species include such unlovely specimens as creosote bush, desert saltbrush, and field mice, well, *who cares?* □ Laura Jackson does. This botanist with the Desert Botanical Garden in

Phoenix cares deeply that hundreds of square miles of Arizona's hard-baked Sonoran desert were plowed up for agriculture, then abandoned in denuded shame. Unimpressed by suggestions that such a desolate area doesn't merit rehabilitation, she launches into a good-natured lecture on land-use ethics:

"No, there's not an endangered species on it. There aren't any special ecosystem functions it's performing. It's not doing anything that's the least bit useful," says Dr. Jackson.

"The main reason for [restoring the desert] is guilt," she continues. "If you took a piece of land and screwed it up for 300 years, and you can *see this from space* — what would your mother say?"

Leave it better than you found it — that's what mothers say. And that's what Dr. Jackson is hoping someone will tell the cities of Mesa and Tucson, both of which own thousands of acres of dead farmland (purchased solely to secure water rights). If land owners are ever ordered to restore abandoned fields, Dr. Jackson hopes to have developed methods for doing just that. (It's not such a far-fetched hope — mining, construction, and logging firms are often ordered to restore lands they use. Why not farmers?)

The Sonoran desert is a harsh place. The average daytime high in summer is 105° F. Each year, just 8.5 inches of rain

falls on the salty soil. The most ambitious creosote and saltbrush plants grow to waist-height. The sandy ground is littered with dull fungus and moss that greens up for just a few weeks each spring. Jackrabbits and mice eat the flora not just for food, but for water as well — there's no other source.

In the '30s, though, miles of this ecosystem were scraped flat, planted with melons, pecans, and cotton, and watered from copious water tables left just a few meters beneath the surface by glacial largess. As farmers abandoned the land in ensuing decades, they left fields that no longer possessed the soil structure or organic content to soak up water and thus support life. Water simply slid away on the crusty surface. The desert had been desertified.

Over the years, fields bordering postage-stamp sized remnants of virgin desert have slowly regained some original vegetation. But desert seeds, which face daunting odds in the healthiest ecosystem, would

"There's not an endangered species on it, no special ecosystem functions it's performing. It's not doing anything the least bit useful."

— DR. LAURA JACKSON



have to travel miles to colonize many fields. So Dr. Jackson is stepping in.

Securing native grass and bush seeds from a local supplier, and sweeping more off the desert floor with a broom, she prepared to plant some test plots. But how to water? Irrigation would be best, until the new plants were strong enough to withstand drought. But it isn't practical.

Instead, she exploited her plots' minute downhill slope by building a series of berms to catch and concentrate rainwater. The 2.4 meters in front of the berm, where water collects, was planted. Rain that falls behind the berm runs 12 meters down to the next berm.

The plots were seeded with desert grasses and shrubs. Two and a half years later, the plots are jammed with plants and are beginning to naturally thin themselves — a sign of health. But life has not ventured forth from the berms into untilled land — a sign of trouble.

Dr. Jackson continues to test other soil types, and chuckles when she says the one rule of restoration is, "It depends." Berms work with some soils, and not others. Germination is great, depending on rain. Mulching works wonders for some plants, less so for others. Theorizing that maximum plant cover is more important than exact recreation of the ecosystem, she pays attention to how weeds perform when they sprout in her plots. She tentatively concludes that a "lazy, patient" approach — seeding year after year until the rain works right — is probably the best method.

Dr. Jackson herself is a model of patience, as she whistles in the solitude of desert restoration. Restorationists, like anyone else, tend to want a pretty end product. They tend to choose restoration projects where at least the bone structure of natural beauty remains: rivers, hilly forests, beaches.

Dr. Jackson cheerfully compares her situation to that of pioneers of prairie restoration: "Up until 15 years ago, there wasn't much following for prairies. Nobody was aware there was ever anything but crops out there.

"We're about 50 years behind prairies in the realization that deserts are interesting and beautiful in their own right." ■

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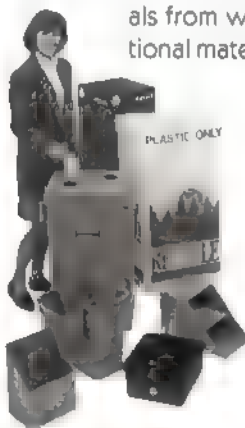
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Bravo Bag

A TRASH BAG MADE FROM 100 percent post-consumer plastic has been a long time coming. Used bag plastic, known as film, is one of the most difficult to recycle. First of all, its light weight makes it inefficient to collect and transport. Then, because it's flimsy, film is hard to chop into uniform, washable bits. And markets for dirty plastic are few.

(Pre-consumer scrap, or industrial trim, is clean, and is easily "recycled" right back into a manufacturing line. When comparing brands, note that finding uses for post-consumer plastics is where the challenge lies.)

Petosky Plastics in Michigan has met the challenge, and the company is now using old bags to make new ones. The line includes 39-gallon lawn and leaf bags, 30-gallon trash bags, and 13-gallon kitchen bags. The resulting bags are clear, with the faintest brown tint. They are extremely tough.

Petosky's bags are marketed under the Canadian "President's Choice" label, and should be priced competitively with

high-quality virgin bags. Look for the label at Fred Meyers, Jewel, and Harris-Teeter supermarkets, among others.

Video Voilá

IT'S AMAZING WHAT A fresh look at an old problem can turn up. When Global Zero decided to make a resource-efficient video cassette shell, the designers started over. Instead of 30 parts, the shell has six. Less to make, less to break, less to recycle. They chose polypropylene instead of

polystyrene, and thus all the parts can be made from one type of plastic. Polypropylene is also cheaper, lighter, and can form "living hinges," which eliminated many parts.

The result is a fresh cassette. The Global Zero shell is 80 percent recycled (from diaper-manufacturing scrap and post-consumer beverage containers). The simpler design means the entire face can be covered with a label, eliminating the need for a cardboard sleeve. Because all the plastic parts are polypropylene, the shell is simple to disassemble for recycling.

For now, quantity orders are the rule, but Global Zero plans to serve consumers eventually. Global Zero, Dept. GM, 80-C, Eisenhower Dr., Westbrook, ME 04092; (207) 854-1600.

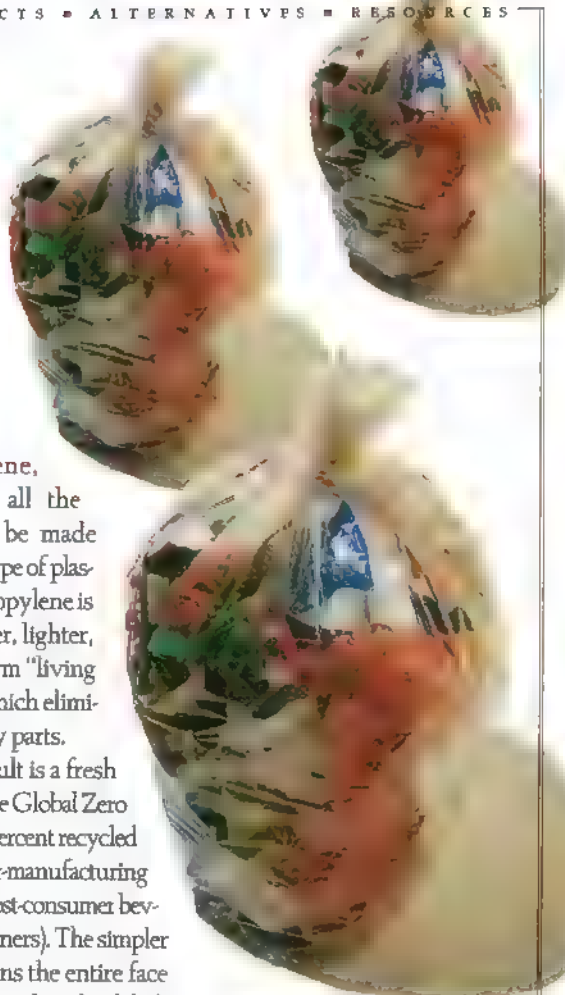
Innovative Insulation

WHEN YOU SET YOUR bin of old beer bottles and pickle jars by the curb, you may think you're recycling, but think again. The market for that old glass

hasn't been great. Bottle makers require very clean glass that's sorted by color and free of metal and ceramic contamination. That's a tall order for any municipal recycling program; as a result, mounds of mixed-color, crushed glass (cullet) are piling up in recycling barns everywhere.

Now you can help use up those mounds when you insulate your house. The Manville brand of fiberglass insulation, made by Schuller International, contains 20 to 40 percent recycled glass, mostly post-consumer. The recycled content may eventually hit 50 or 60 percent, as our recycling savvy generates a dependable supply of contaminant-free glass.

The best news for recy-



clers is that Schuller's four mills will pay \$30 to \$50 a ton, even for mixed-color glass, which is the hardest to unload. The resulting insulation is a gold color, and can be found at Home Depot and similar hardware and home-improvement stores.

RESOURCES

Voluntary Simplicity:

Toward a Way of Life that is Outwardly Simple, Inwardly Rich

by Duane Elgin.
231 pages. William Morrow Books, Special Sales, 1350 Avenue of the Americas, New York, NY 10019; (212) 261-6565. Softcover, \$11.50 ppd.

REMEMBER MY FIRST RUN-in with voluntary simplicity: a potluck dinner at a cabin in the woods. It was a tiny place, packed with children, and dimly lit. I was a teenager, already struggling with my own family's lack of television and insistence on simplicity. Although I was impressed with the

commitment of these people, it was my most fervent prayer that my Mom not get any ideas.

Years later, reading Duane Elgin's treatise on the subject

VOLUNTARY SIMPLICITY



TOWARD A WAY OF LIFE THAT IS OUTWARDLY SIMPLE, INWARDLY RICH
DUANE ELGIN
REVISED EDITION

(revised from the 1981 version), I discover that I had acquired the ideas myself. Voluntary simplicity, Mr. Elgin says, must be tailored by and for the individual. Depending on the circumstances, you may voluntarily move to the kerosene-lighted cabin, or you may keep the in-town apartment, but buy your few clothes at the thrift store, and your vegetarian fare at the co-op.

Voluntary simplicity, he argues, is not about choosing poverty and grinding sacrifice. (That's the path to neurotic martyrdom.) To choose simplicity over complexity requires the realization that our possessions often become our masters, requiring payments, maintenance, and time. The choice to not consume is also a choice to free up time for intangible riches like family, friends, and development of self.

Some sections of the book rely heavily on quotes from a 1977 survey of voluntary simpletons, which renders some subjects (especially the discussion of how voluntary simplicity would liberate women) quaintly dated.

governmental agencies, parks, recycling centers, natural history museums, even sewage treatment plants, in all five boroughs. The points of interest are keyed for quick interpretation and the corners of the big, folding map are crammed with extraneous information, like my favorite factoid: Broadway was originally an Indian trail, following a ridge from one end of the island to the other. \$4 ppd from Modern World Design, Dept. GM, 157 Ludlow St. #4, New York, NY 10002.

.....

The Last Panda

by George B. Schaller.
352 pages. University of Chicago Press, 11030 South Langley Ave., Chicago, IL 60628; (800) 621-2736. Hardcover, \$27.95 ppd.; Illinois and Canada residents add tax.

Grappling with the Apple

IF YOU THINK LIFE IN THE Baked Apple is devoid of environmental quality, check out the Green Apple Map, a guide to

the New York City environment. The map locates all kinds of sites, from canoe launch sites, recreation areas, botanical gardens,



ZOOLOGIST George Schaller's account of five years with the pandas will bring you face to face with the mammoth problems — cultural, political, and logistical — that confront any effort to save a species; His employer, the World Wildlife Fund, spent days bickering with Chinese officials over how [Continued on p.56]

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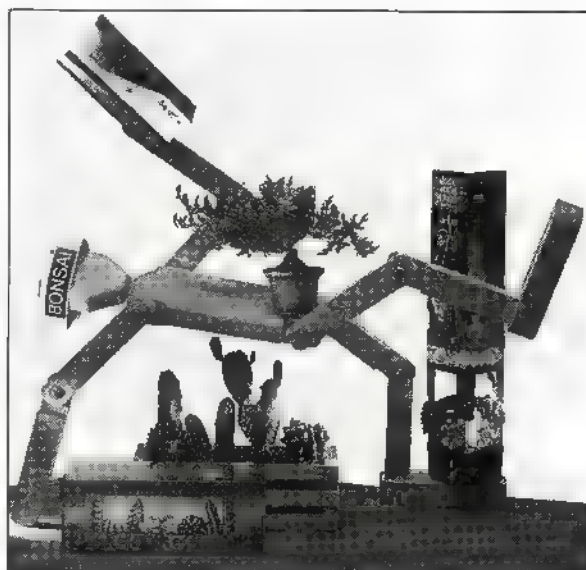
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[Cont. from p.54] many millions of dollars we would spend on a research facility stocked with un-needed technology toys. While Dr. Schaller was away from the research camp, Chinese employees on the project taught a wild panda to snarl and charge at people in exchange for food. Lured by high prices for panda pelts, hunters continue to poach the docile creatures.



"Accounts of battles to save whales, rhinoceroses, and other species ... tend to shy away from disclosing the true conservation conflicts, the basic issues of human greed and indifference," writes Dr. Schaller. "The panda has become a lucrative commodity ... and thus has revealed ignoble traits hidden in some individuals and organizations." His honest account of this dynamic is simultaneously enlightening and maddening.

But his frustration and disappointment drop away when he's in the field. A life-long wildlife researcher, his enthusiasm for the slimmest serving of insight is infectious: He was an avid col-

lector of panda poop, which he and his wife would dry and analyze. He spent days tramping through rain and snow and dripping bamboo to record the travels of the animals he managed to fit with radio collars. His accounts of mating episodes are touched with humor and a sense of awe. Dr. Schaller never seems to forget that he's extraordinarily privileged to be sharing the panda's habitat, an awareness that gives his writing a feeling of startling immediacy. He is an honest and impassioned ambassador.

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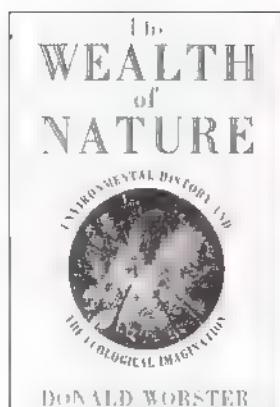
The Wealth of Nature

by Donald Worster.

255 pages. Oxford University Press, Customer Service, 2001 Evans Rd., Cary, NC 27513; (800) 445-9714. Hardcover, \$25 plus postage.

WHATEVER YOUR SCHOOL of thought regarding the interaction of human beings and the environment, historian Donald Worster's essays will tweak your curiosity and rattle your assumptions.

Because he's first of all an historian, Mr. Worster's essays on the history of land use and ecological consciousness are powerful, as is his analysis of the current chasm between ecology and agriculture. It's the essay on sustainability, though, that stays



with me the longest. The call for sustainable development, he says, is just a desperate, last-ditch effort to save our necks without giving up the glittering promises of capitalism. No one, he points out, considers sustainable development to be eternally sustainable — just sustainable for a while. The path to true sustainability is much harder to face, requiring a spiritual overhaul and a non-material standard of living.

Although daunting, this book gives us a refreshing voice in the din of ecological economics, risk analysis, and market-based arguments for environmental quality.

.....

California's Threatened Environment: Restoring the Dream

edited by Tim Palmer.

305 pages. Island Press, P.O. Box 7, Covelo, CA 95428; (800) 828-1302. Softcover, \$20.20 ppd.; California and D.C. residents add sales tax.

CALIFORNIA COMPRISES the seventh largest economy in the world, houses 12 percent of the U.S. population, and boasts fantastic geographic diversity. All this bounty translates into tremendous environmental pressures on air quality, water quality and availability, wildlife habitat, and so on. The resulting crush has pushed the state to the fore of environmental protection regulations, so that California is simultaneously praised for its progressive environmental standards and berated for its water nightmare, clearcutting, and sensational smog.



These essays — which cover everything from transportation to energy, population, agriculture, water, forests, planning, solid waste, and more — take one subject at a time and explore the pressures that shape the issue. The slate of solutions, which are implicit in each essay, hold hope for the rest of the country.

— Reviews by
Hannah Holmes

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TP or Not TP: Which Brands Clog My Septic?

My septic tank is clogged. Could it be that the soft, pil-
lowy brands of toilet paper we use tend to clog septic
tanks more than thinner, coarser brands?

HUGH CHRYSLER JONES
New London, Conn.

THE TYPE OF TOILET PAPER YOU USE DOESN'T matter so much as the quantity, the nutrient load of the other materials you wash down the pipes, and how regularly you maintain your septic tank. If wads of paper are backing up in the tank, it could be a sign your tank needs fixing, or that someone in the house is using too much TP. A discreet poll of your brood may be in order.

That said, there are apparently some gradations between how different types of toilet paper perform in tankus. A totally unscientific GARBAGE poll of local septic-tank pumpers turned up this general rule of thumb: The plainer (thinner, cheaper) the paper, the more quickly it will degrade.

Pumpers specifically cite the conventional wisdom that dyed and scented papers take longer to degrade than white, unscented paper. I tend to believe the guys that actually pump tanks, but a 1975 study conducted at the University of Leuven in Belgium found little evidence that dyes affect decomposition rates. Roger Bognar, tissue-paper honcho for the American Forest and Paper Association, emphatically agrees, suggesting that it is simply easier for pumpers to see the colored papers.

Tom Stevens, manager of pollution and hazard control at NSF International (formerly the National Sanitation Foundation), says the most important paper characteristics slowing degradation are the materials added to soften the paper and bolster its "wet strength." These generally are chem-

icals that strengthen the bonds of the paper fibers. (The additives used by particular brands are closely held proprietary secrets.)

The non-profit NSF International bestows a registered mark of approval as "fully acceptable for septic tanks" to all toilet papers that pass its rigorous six-month testing procedures. Look for the mark on any toilet paper you buy.

Quoted in a recent report on the subject by the EPA's National Small Flows Clearinghouse, Diana Miller of the Indiana Pumper Assoc. suggests employing the Mason Jar test: "Put one square of your favorite toilet paper in a jar with water and let it set. If the toilet paper has not started to dissolve after one hour, that's probably not the kind of toilet paper you should use."

For a free copy of the report, contact the EPA National Small Flows Clearinghouse at (800) 624-8301.

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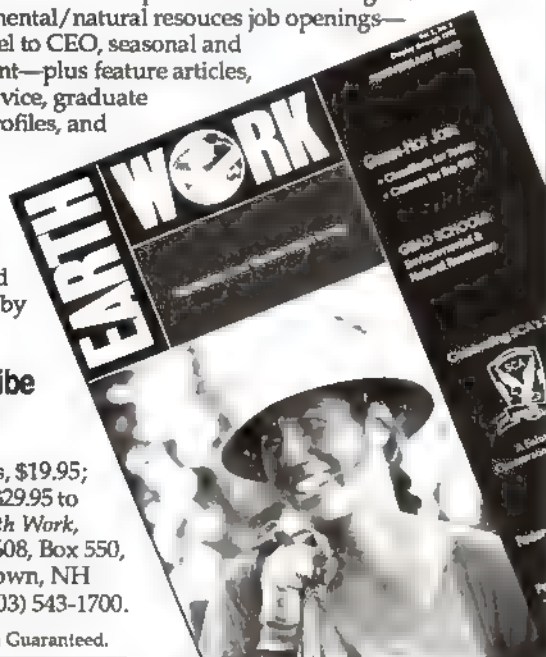
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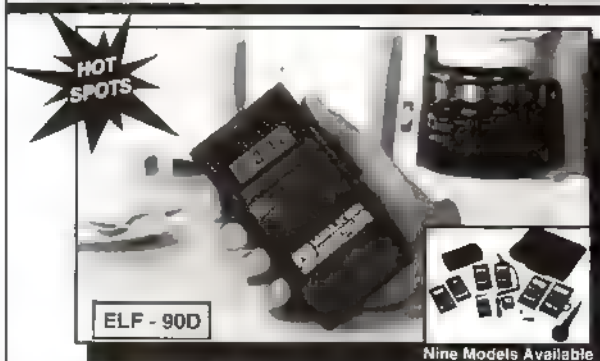
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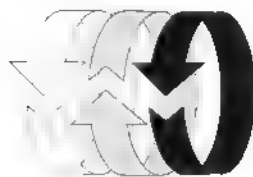
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reduce my hot-water costs?

RON MCKERNAN
San Francisco

LET'S START WITH THE OBVIOUS: THE FASTEST way to save on hot water is to use less. Washing clothes in cold water and using low-flow showerheads and low-flow aerators on faucets can significantly reduce your hot-water energy use.

Another easy way to cut water heating costs is to reduce the temperature on your boiler. Many water heaters are set at 140° or higher. Reducing that to 120° will still give you a good hot shower, and for each 10° reduction you should save 3-5% on your water-heating bill. (This may mean, however, a longer wait between showers.)

Manufacturers recommend that you don't dip below 120°. Lower temperatures could facilitate harmful bacterial growth in the heater and pipes, and dishwashers will lose much of their effectiveness.

You should also wrap your heater in an insulating blanket. Blankets designed for water heaters are available at hardware stores and are sized according to the number of gallons your tank holds. Make sure to keep the blanket between the drain line at the bottom and the top edge of the tank, and be careful not to cover the thermostat. Insulating your hot plumbing lines with at least 3/4"-thick insulation will help, too.

Reducing sediment buildup in the base of the tank is another energy saver. Sediment slows heat transfer from flame to water, making the heater less efficient. Getting rid of it, though, is probably a job you'll want to leave to a professional, unless you have some experience with plumbing.

The best book on the subject is *The Water Heater Workbook* by Larry and Suzanne Weingarten. Contact Elemental Enterprises, P.O. Box 928, Monterey, CA 93942; (408) 394-7077. \$11.25 ppd.

Metal: The Breakfast of Champions?

My high-school chemistry class recently conducted a lab on breakfast cereals. Many of the brands we tested had significant traces of elemental iron. Could these small pieces of metal be abrasive to the digestive tract or otherwise harmful?

AMANDA FULLY
Crestwood, Ky.

THE SHORT ANSWER: NO. IRON HELPS IN THE production of red blood cells, among other important bodily tasks. In correct doses, those little bits of metal are good for most of us, especially young women.

Cereal makers "fortify" their products with iron to meet nutritional goals set out by the Food and Drug Administration. "Total," for example, has 100 percent of the U.S. Recommended Daily Allowance for iron: 10 milligrams per serving.

The type of iron most often used in cereal is called "electrolytic," after the process used to derive it. Cereal makers use electrolytic iron because it's highly stable — it doesn't affect a cereal's taste or color. The iron is not, however, particularly easy for the body to absorb. So, in order to meet "bioavailability" standards set by the FDA, it must come in very small particles, usually between 20 and 40 microns. (A micron is one millionth of a meter.) Any larger pieces you found were probably several bits glommed together on your magnet.

General Mills, which produces 34 cereal brands, sends each box of its cereal through a metal detector before it leaves the factory. According to spokeswoman Kathryn Newton, these detectors are sensitive enough to go off if iron levels are even "a little too high."

The iron particles' diminutive size eliminates the risk of abrasion to your digestive tract, but their shape also helps: During the electrolytic process, which involves precipitating the iron out of solution, the particles crystallize into a rounded, fern-like shape with very few jagged edges.

There is some disagreement among nutritionists over exactly how much iron intake is good for you. You should probably not be regularly exceeding the U.S.R.D.A. unless your doctor discovers you have an iron deficiency. Because women lose iron during menstruation, they are more likely to have an iron deficiency; men need to be careful about ingesting too much. While you should be mindful of your general intake levels, you needn't be especially concerned about the iron in cereal. ☐

Questions? Write to: Ask Garbage,
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we can't provide individual responses.

LETTERS [continued from p. 13]

(1979, 1992) and Tom Regan's *The Case for Animal Rights* (1983), then move on to works by Steven Sapontzis, Bernard Rollin, Dale Jamieson, and others.

GARY VARNER
Center for Biotechnology Policy and Ethics
Texas A&M Univ.
College Station, Texas

THE TITLE OF YOUR FEATURE ERASED ANY HOPE that objectivity would follow.

First, show photos of sad-eyed vivisectors in their burned-out labs with captions along the lines of: "Vicious terrorists destroyed centuries of vital planet-altering research." Then quote the vivisectors and their friends exclusively. Finally, misquote animal rights activists and make up your own definitions of their philosophy. For the record, Ingrid Newkirk's *entire* quote is: "When it comes to feelings like pain, hunger, and thirst, a rat is a pig is a dog is a boy."

Animal rights activists do not equate the needs of a rat with the needs of a child; we feel the rat deserves equal consideration of his or her interests.

ALISA MULLINS, staff writer
People for the Ethical Treatment of Animals
Washington, D.C.

ENVIRONMENTALISTS ARE TRYING TO POINT out that many chemical compounds exist only because of the self-perpetuating logic of the market. Chemical companies benefit, but humans and the environment would benefit with an end to production of many agricultural and industrial chemicals.

Animal testing continues for two reasons: a market system that produces unnecessary and harmful products, and human notions of domination over nature that are part of the market system's continuation.

SCOTT VAN VALKENBURG
Dorchester, Mass.

MR. BREEN STATES, "ANIMAL TEST RESULTS cannot always be accurately extrapolated to humans." Then why perform them? I'll tell you why. Researchers are interested in money, power, publicity, and prestige. Animal research has become a source of gold

for vivisectors. The exploited fear of cancer and other diseases has become an inexhaustible source of income for the researchers.

After decades of research and billions of dollars spent annually, we now know a few thousand ways to artificially induce cancer in animals.

JOSEPH SHIMSHAK
Bayonne, N.J.

BILL BREEN'S CONTEMPT FOR RAT=BOY IMPLIES a contempt for the hundreds of millions of non-Christian, non-Jewish, non-Muslim peoples who would perfectly accept the religious and philosophical soundness of that equation.

The moral questions are not black and white, which is why Mr. Breen wanted to avoid them altogether. But they need to be asked: Would you let your pet dog be experimented on, in great suffering, if you knew it would save your daughter's life? If there was just a 1% chance that it would save your daughter's life? How about your neighbor's dog? Just any old dog? If you knew it wouldn't save anyone's life, but might help protect a company from a lawsuit?

For me, although some of the decisions would be agonizing, the moral answer to all of them is NO!

KARL SMITH
Richmond, Calif.

AFTER READING BILL BREEN'S EXCELLENT PIECE on animal testing, I had to write and share a few thoughts I have on the subject, which I have kept to myself often enough in my coven of environmentalist friends.

The most obvious waste of animals' lives is at the local animal shelter. Hundreds of thousands, if not millions, of animals are killed every year at shelters and humane societies nationwide. The animal-rights movement has resulted in humane societies' refusing to donate animals, destined for death anyway, to research labs. Why not let their death serve some greater purpose?

Keep throwing controversial ideas at all of us. If we never come across new ideas, [we're] just the same old sheep.

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Impotent Inoculants

COMPOST ACTIVATORS: YOU'VE PROBABLY SEEN THEM IN GARDENING catalogs, those concoctions that promise to "turbo-charge" your compost pile, making it "faster and smarter." Known variously in the trade as inoculants, activators, and bacterial boosters, these arcane elixirs have been marketed since back-to-the-landers popularized backyard compost-

ing in the 1970s. Yet, to this day, marketers rely on little more than personal testimonials and unpublished research to back up their claims.

Name-brand compost inoculants — such as Necessary Trading Company's "Compost BioActivator," Ringer's "Recycle Compost Maker," and Sudbury's "Bio-Dynamic Compost Inoculant" — are comprised of jillions of aerobic and anaerobic bacteria and fungi spores. The idea is that by unleashing them on your pile, the microbes increase the overall number of "beneficial decomposers" and hasten the composting process.

In fact, they probably aren't needed.

Research during the 1970s by Dr. Clarence Golueke and a team of biologists at the University of California at Berkeley studied the efficacy of inoculants including horse manure, "rich" soils, composting material, and two commercial preparations. As Dr. Golueke recounted in *Composting: A Study of the Process and its Principles* (Rodale Press, 1972): "The composting process was neither accelerated nor the final product improved, even though the inoculants were rich in bacteria."

Many organic gardening methods and products are backed by independent testing, but composting activators aren't one of them. Of all the manufacturers, university researchers, and professional composters I've talked with, not one can point

to a replicable, third-party study of inoculants for home composting.

In 1991, Ringer's literature cited "university tests" which showed that for a day or two, the temperature in the inoculated pile peaked some 15-20° F. higher than the control pile. Four times in the past

three years I've asked Rob Ringer, manager of marketing services, to send me a copy of the research. I still haven't received it. Recently, however, Mr. Ringer did call to say that the company is phasing out its compost inoculants. "We don't have the scientific data to back up a quantifiable effect," he said. "We think of inoculants as an insurance policy."

Compost activators don't cost much (\$2-\$12) and they won't muck up your pile. But unless an independent lab proves otherwise, claims for these concoctions belong in the dumpster. Science and practice demonstrate that compost happens — pretty much by itself.



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char·is·mat·ic meg·a·fau·na, *noun* — Large, charming animals on whom we spend the lion's share of our endangered-species dollars.

The term appeared in the January '92 issue of *The Atlantic Monthly*, where Dennis Murphy, director of the Center for Conservation Biology at Stanford University, praised bald eagles and elk for mustering public support for the Endangered Species Act.

Sustained interest, however, is with a business economist at Washington University in St. Louis, Dr. Don Coursey. He has compiled a database that maps the nation's spending per endangered species. His discovery? The public prefers to spend its tax dollars on big, pretty animals, showing little regard to their ecological value.

By tallying our expenditures per species, then estimating how many individual beasts are saved, Dr. Coursey gets a dollars-per-head figure. Topping the charisma charts are the Florida panther (\$5 million a cat), the California condor (\$1.5 million a bird), a \$1.1 million warbler, and a \$600,000 parrot. Coming in at \$1 (or even \$0) are endangered spiders, snails, mussels, rats, mice, and bats. "People feel that large mammals are more important than some measly old slug," says Dr. Coursey. Thus, the scale represents an emotional reaction to species, not a hard-headed analysis of each animal's role in the ecosystem.

Dr. Coursey hopes his research will allow economists to reconcile two very different sets of numbers: What people say they'll pay for environmental improvements, and what they actually do pay. When asked, most people inflate the amount they're willing to pay to save a species. We need to formulate questions that will yield a more accurate prediction of what they'll actually shell out. For example, Dr. Coursey finds that people give lower — and more accurate — values to individual species when his questionnaires list other things the same dollars could be spent on.

If panthers and parrots are to be known as charismatic megafauna, how shall we address the ugly species we so woefully neglect? "I'm no psychologist," says Dr. Coursey, "but I call them the 'things that Hollywood uses to scare us.'"

